Railway Maintenance Engineer

Volume 17 CHICAGO—APRIL, 1921—NEW YORK Number 4

PERFECT INSULATION
Reinforced by the BONZANO THOMSON features of metal distribution combined with superseasoned fibre, the Q & C INSULATED JOINT represents the last word in track efficiency
The Q & C Co.,
90 WEST ST., NEW YORK
RAILWAY EXCHANGE BLDG., ST. LOUIS
PEOPLES GAS BLDG., CHICAGO

International
Steel Crossing Foundations

Why Is the Cost of Crossing Maintenance So High?

BECAUSE wooden ties cannot be arranged under crossings so as to distribute the loads into the ballast.

If they are located to carry one track, the other must go unsupported.

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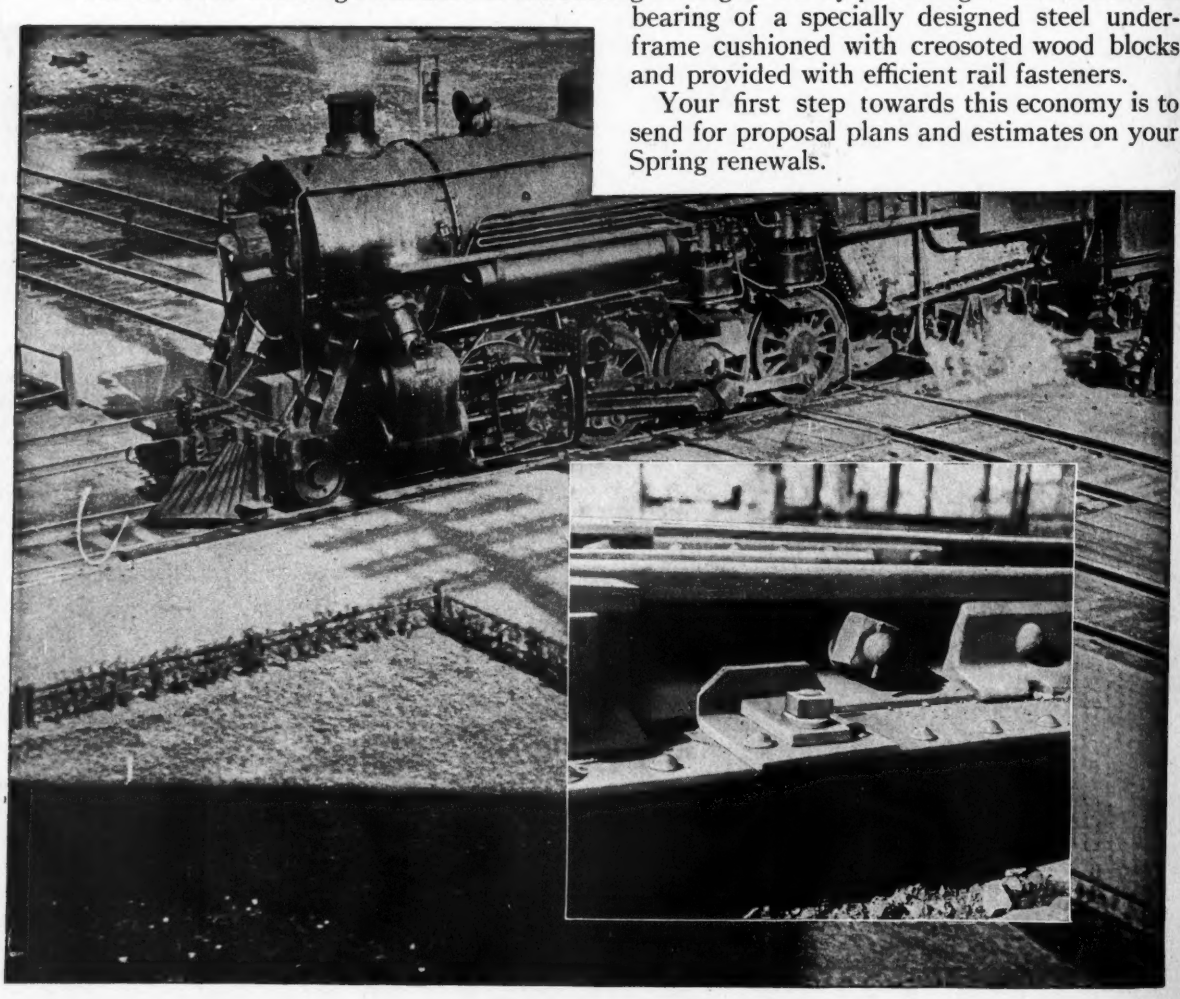
Users of Steel Crossing Foundations are cutting the high costs by providing a wide based unit bearing of a specially designed steel underframe cushioned with creosoted wood blocks and provided with efficient rail fasteners.

Your first step towards this economy is to send for proposal plans and estimates on your Spring renewals.



The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

16704 Waterloo Road, Cleveland, Ohio

RAILWAY MAINTENANCE ENGINEER

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Good light is an absolute necessity at a night wreck.

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AND THE

SPRAY METHOD

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One of our SPRAYING Units will treat 100 miles per day.

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With deferred tie and rail replacements, can you afford to use your reduced track forces for hand weeding?

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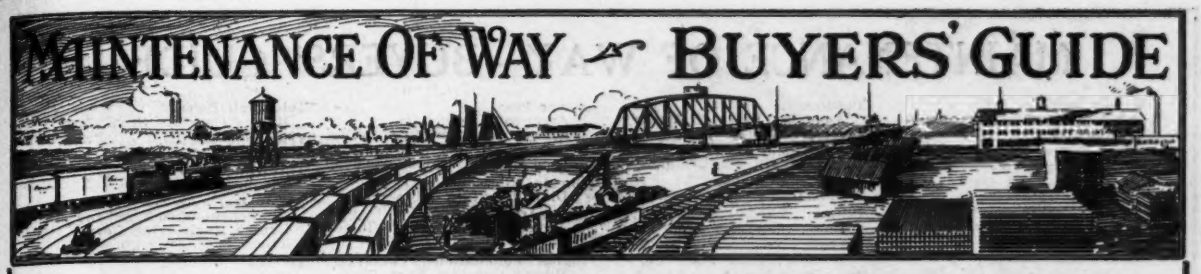

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The RED TOP Guarantee

WE guarantee RED TOP Steel Posts will not break, burn, rot or frost-heave in the fence line; that they are free from defects in material and workmanship; that they will outlast the heaviest fencing manufactured.

We guarantee RED TOP Posts to be just as represented in our literature and advertising.

Any RED TOP Post which does not fulfill the above guarantee will be replaced by your dealer —without cost or argument.

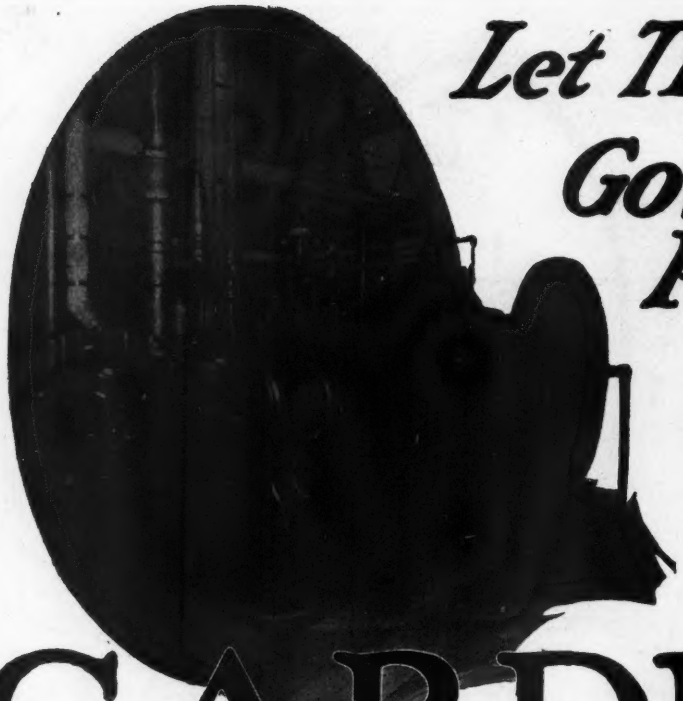
BROOKE ANDERSON, *Pres.*
CHICAGO STEEL POST CO.

Railway Representatives
Maintenance Equipment Co.
Railway Exchange Bldg., Chicago, Ill.

For booklet describing RED TOP Guaranteed Steel Fence Posts and their money saving features, address **Maintenance Equipment Co., Railway Exchange Bldg., Chicago, Ill.**

Red Top
GUARANTEED
Steel Fence Posts

Let This Mark Govern Your Purchases



GARDNER
TRADE MARK

GARDNER

Photograph shows a Gardner Horizontal Steam Driven Compressor on the job in Carson Pirie Scott & Co.'s building, Chicago.

A Gardner pump, or governor or compressor may cost a little bit more than some other make but *it is worth more.* Gardner products are built better, so they last longer and do better work.

Back of every Gardner product is the accumulated experience of 62 years of careful building.

Recently we have revised our bulletins describing Gardner products. We will gladly send you those you wish.

THE GARDNER GOVERNOR COMPANY
Quincy, Illinois

Pumps --- Governors --- Compressors

Chicago	New York	Philadelphia	San Francisco	Los Angeles
Fisher Bldg.	Singer Bldg.	604 Arch St.	505 Howard St.	409 E. Third St.

BUCYRUS

They were both cut and trimmed in one operation on the Union Pacific by a

BUCYRUS SPREADER PLOW

with a special ditching and shouldering attachment, which is a part of the standard wing.

The Bucyrus Spreader Plow will plow and spread more and stiffer material and work at greater operating ranges than any spreader built. Furthermore, it will build fills to any height in 7 ft. lifts, thus eliminating trestle work. All operations air controlled. It will pay you to investigate.

Send for Bulletin SP-D

Front view of the Bucyrus Spreader Plow in action shouldering and ditching. One trip through gets results like those shown at the top of this page.

BUCYRUS COMPANY

South Milwaukee, Wis., U. S. A.

New York, Chicago, Minneapolis, Birmingham, Cleveland, Denver
San Francisco, Portland, Ore., Salt Lake City
Pittsburgh, Richmond, Va.

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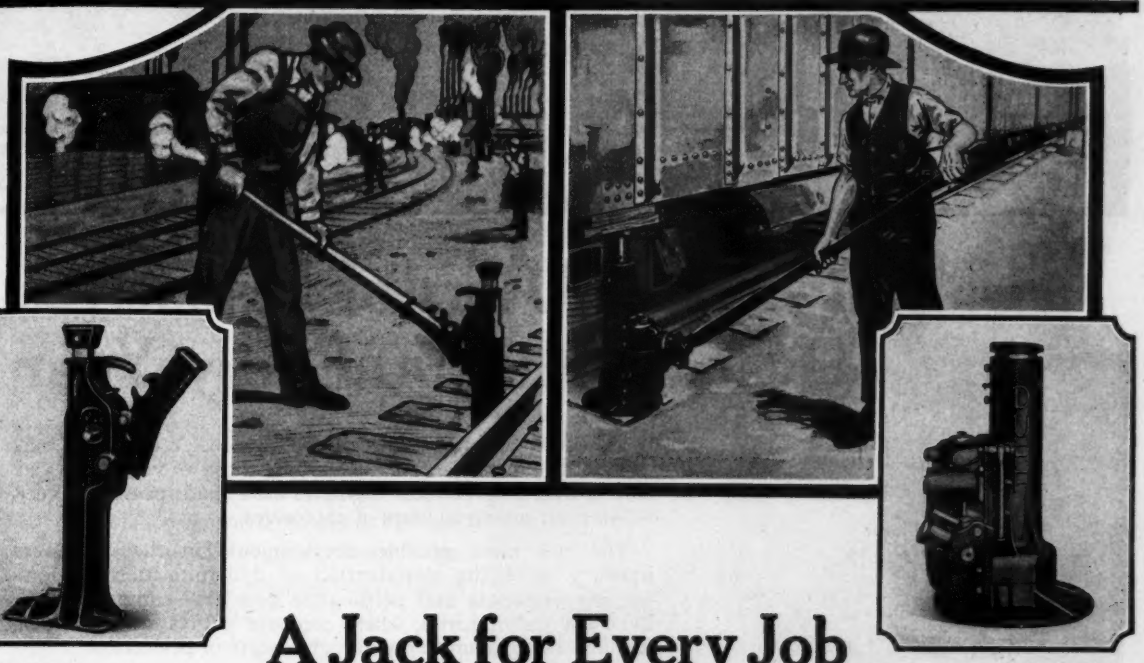

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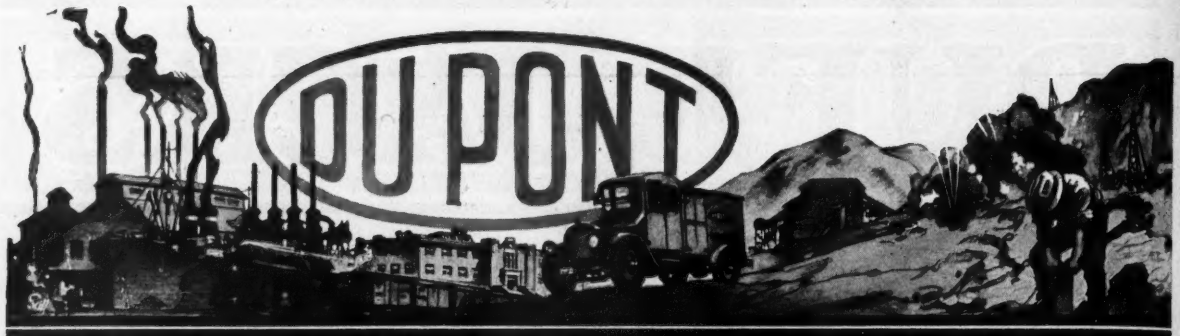

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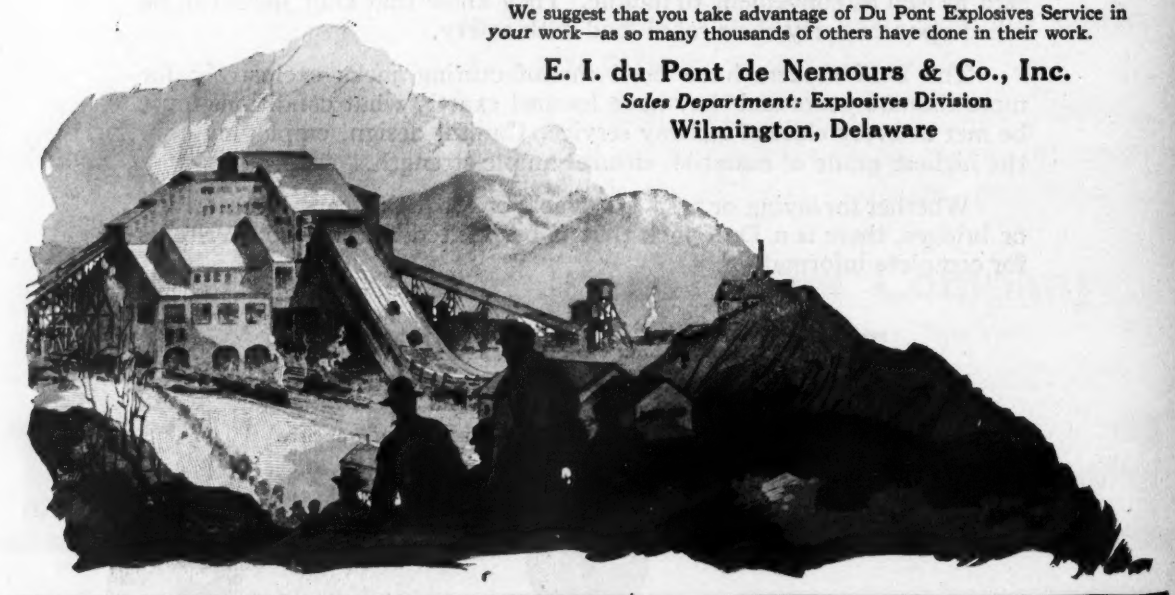

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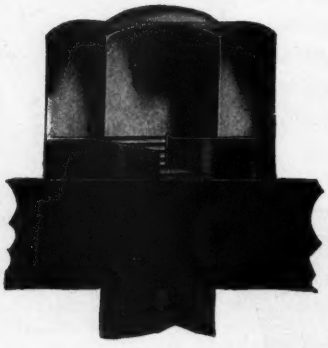

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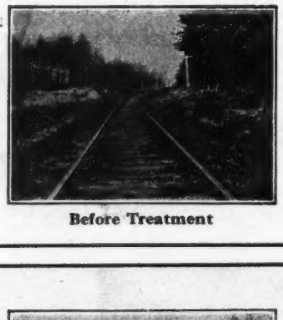
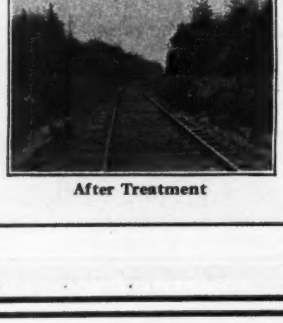


Before Treatment



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Railway Maintenance Engineer

Vol. 17 April, 1921 Number 4

(With which is incorporated the Engineering and Maintenance of Way Edition of the *Railway Age* and *Railway Engineering and Maintenance of Way.*)

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A Modern Pumping Station

A photograph appearing on another page illustrates in striking fashion the progress which has been made in pumping equipment and auxiliary facilities in the last few years. Perhaps the most striking feature of this picture is the small size of the pumping and power units. Compared with equipment of similar capacity in the reciprocating pump operated by steam with which we must include the boiler and the coal bunker, these modern electrically-operated centrifugal units seem exceedingly small. Another noteworthy feature of this layout is the exposed piping, all of the pipe lines including the suctions being above the floor level. This is an example of the extreme transition from the practice of old days when as much of the piping as possible was buried beneath the pumphouse floor or in the ground with the result that in many old plants no one knows exactly where the pipes are. A plant like the one at Kankakee will surely be kept in good condition more readily than an outfit of the older type.

Maintaining Bridge Approaches

An article on page 124 outlines practices designed to help the section foremen overcome or at least reduce the difficulties attending the maintenance of tracks on bridge approaches. There is a very good reason why these approaches give trouble. An embankment is subject to shrinkage and subsidence (which may continue for years), while a bridge abutment normally is not. Therefore, as the settlement of the roadbed is taking place the track on the bridge floor remains at the established level. This condition is sometimes aggravated by the form of the nose on the end of the embankment. Wing walls may not be broad enough while abutments of the "T," "U," or trestle type may not support the embankment properly in the direction of the bridge. Whenever the condition of the embankment is such as to give the track foreman undue trouble, it is up to the supervisor to discover the cause. If it arises from settlement there is no cure but to widen the shoulder and make repeated raises of the track. If the slopes are spilling away, steps should be taken to raise the wing walls, widen head walls or construct toe walls.

Make Every Hour Count

Although forces have been curtailed greatly, the necessity for the maintenance of tracks and structures in a safe condition has not been reduced in the least. The responsibility of those in charge of this work has thereby increased materially because of the reduced amounts of labor and materials with which they may perform the necessary work. This makes it of primary importance that every hour of labor and every unit of material be utilized to the best possible advantage. Lost motion resulting from inefficient work of forces is to be deplored at any time; it is doubly serious now. It is absolutely necessary that division engineers, roadmasters, master carpenters and other supervisory officers so plan their work and dis-

tribute their forces that the properties under their charge may be uniformly maintained to as high standards as the men and materials at their disposal will permit. This can only be done when all waste effort is eliminated. Likewise foremen can afford to plan their work carefully in order to make every effort count. A study of the operations of the average gang during the last two years will show that a surprisingly large part of the work of the men has been unproductive from one cause or another. This slack can and must be taken up now. It can in general be done with little or no added exertion, simply by the exercise of more care in planning operations. Such a procedure is essential for the present and is also the foundation on which to build for more efficient work in the future.

Keep Up the Enthusiasm

The three conventions of the maintenance of way department supervisory officers occur in the fall, but the success of these meetings depends almost entirely on the work done by the various committees for several months preceding. All association activities and particularly committee work are influenced very largely by the enthusiasm and spirit put into them by the association officers and the committee chairmen. In fact, the value of the leader in association affairs is measured almost entirely by his ability to push the work along through a form of contagious enthusiasm. This is a rare attribute and it was never so important as at present when curtailment of maintenance of way expenditures and general programs for retrenchment have exercised a very depressing influence on the spirit of many railway officers who are normally very enthusiastic about their work and that of the association relating thereto. Imbued with the feeling that the present is the darkness before the dawn so that a time more favorable to association activities will soon be at hand, some of the leading spirits in these associations have been rather inclined to defer the completion of plans for the association work. This is a mistake. Railway supervisory officers may be depressed at present owing to the curtailment of the work under their supervision. But by the same token they now have more time on their hands to devote to association matters than they will have after programs for the season's work on their railroads are definitely outlined. Get ready for the conventions now.

THERE IS ROOM FOR IMPROVEMENT

THE RAILROADS of this country use more than 2,000,000 gal. of paint each year on bridges and buildings, the cost of which, including the labor of application, adds nothing to the value of the railroad as a transportation utility. The money is spent in combating the ravages of time and the elements. Obviously, every effort should be made to reduce these expenditures insofar as may be done without impairing the results. All painters will agree that there is no substitute for a good coat of high-grade materials. In other words, there is little opportunity to economize in the quality and quantity of the paint applied. Therefore, the only opportunity for reduction in expenditures for painting is to be found in the labor cost of cleaning the structures and applying the paint.

In the great bulk of painting work done, both of these operations are still being performed with the same tools that have been used since the very beginning of painting, notwithstanding the fact that sandblasting and spray painting have long since passed the experimental stage.

Although sandblasting is being applied extensively in some lines, its use on bridge work has been limited and it is entirely possible that the ultimate solution of the bridge cleaning problem will involve the use of some form of power-operated brushes, chippers or scrapers. But surely something more effective than the present laborious, ineffective and seemingly purposeless hand cleaning process will eventually be put into general practice. It would seem, however, that the sandblast *per se* has not been given the thorough test on bridge work that is warranted by the present need of something better than the hand methods now in use.

Without doubt the paint spray, like any other practical device, will be subjected to extended improvements with continued use, although there is every reason to believe that the application of paint in the atomized form is basically correct. Moreover, the several types of sprayers now commercially available have been subjected to a wide field of everyday practical usage, and the present need is not so much for further improvements in the equipment as for further actual applications of the means at hand. Paint spraying has been proven thoroughly successful as a means of lowering the labor cost and in producing serviceable coatings for many classes of equipment and for certain classes of structures. Therefore, the railroads with a great variety of structures, requiring as they do such large expenditures for painting, should undertake paint spraying on a larger scale than they have in the past, and in doing this they should not restrict the work to those structures on which it has been a demonstrated success in the past, but should give the process a thorough trial under as wide a variety of conditions as possible.

WHAT KIND OF A LINE ARE YOU TRYING TO MAINTAIN?

AT THE PRESENT time when financial necessities are forcing the roads to make drastic reductions in expenses, there is much to try the mettle of maintenance of way officers. Confronted as they are with the obligation to reduce forces to the minimum and to conserve materials to the maximum, they are still charged with full responsibility for the safety of tracks and structures and for the economical conduct of their work. This situation is giving rise to two opposite reactions.

On the one hand, there is the man who resents the retrenchment which he has been forced to put into effect and is discouraged as to the present and the future. He sees his plans for the season's work wrecked without any promise as to what he may expect. His frame of mind is all the more pessimistic, for whereas he recently thought in terms of hundreds of men and thousands of dollars' expenditures, he must now plan for gangs of twenties and for expenditures limited to a few hundred dollars. He is finding difficulty in readjusting himself mentally and otherwise to the changed conditions, and is critical of his superior officers who have transmitted to him the instructions for the curtailment of activities. The ultimate result is that he is losing confidence in himself and interest in his work and this reacts adversely throughout his entire organization.

On the other hand, there is the man who, receiving the same instructions as to curtailment of forces and expenditures, realizes that the net revenues of his road have decreased to the vanishing point, and that it is necessary for every loyal employee to put his shoulder to the wheel if his road is to weather the storm. He knows that we are passing through the readjustment following the greatest war the world has ever witnessed, and that the storm will pass all the quicker if everyone does his best during the chaotic period through which we are now passing.

Adopting the slogan of a prominent metropolitan newspaper, "1921 will reward fighters," he is setting out to meet conditions as they exist with a determination to make the best of affairs and to do his utmost to keep the property under his care in the best possible shape.

The present demands that every maintenance of way officer determine which type of man he will strive to become—whether he be chief engineer, supervisor or foreman. Results will tell which course he has chosen. No great thing was ever done by any man or group of men who did not have an ideal and who did not work steadily to the attainment of that ideal. This is not the first time that the railways have faced difficulties such as they are now encountering, and that maintenance of way expenditures have been pared to the bone. While uneconomical in the long run there come times when even such drastic measures appear to be necessary. This is such a time.

If under the circumstances the old methods no longer apply, then it is not only fitting and proper but exceedingly wise to set them aside and, for the time at least, develop new ones to take their place. Every roadmaster, for example, is fully aware of the amount of work which 10 or 20 men can do and, during normal times, he would have made it a point to see that he secured the maximum efficient results possible from that number. Within certain limitations, perhaps, the same number of men can still do the same amount of efficient work. Furthermore, it will be much needed work that will go far toward upholding the standards of the road, providing that it is intelligently supervised. The restriction of activities offers one opportunity in enabling the officers throughout the maintenance and engineering department to get into a more intimate contact with their road and their forces than has been possible for a long time. Such an opportunity will only have been most effectively utilized when a better spirit of co-operation between the road and the employees has been obtained and a large part of the prevailing uncertainty of thought has been swept aside. To do this, however, means that there must be a spirit of confidence unmistakeably evident in both the words and actions of the local and supervisory officers. This will not come through dreams of past performances, but only through the thorough execution of such duties as there are to be done now. Work well done always breeds confidence.

Those roads and those officers which are making progress under present circumstances are facing squarely what is before them. Their officers are pushing ahead consistently and diligently with all that can be done, and doing it in the most thorough way possible under the adverse conditions. Such men are living and working in the present with their eyes wide open to the future. In contrast to this there are far too many who, while apparently very busy, are actually exerting themselves strenuously at doing nothing. It is well worth while to study ourselves as well as our problems.

SERVICE

Service, like people and property, has character. It is ours to mold that character. If we haul the President of the United States, move a car of coal, turn an axle, forge a bolt, tamp a tie, add a column of figures, let us put our hearts into the work—give of ourselves the best. Thus will anything we do be stamped with the seal of personal touch which alone makes accomplishment priceless. We want our product above all others to be distinguished by its high character. Just as our property is different from the common run, so we would serve our patrons with signal individuality. We shall win not *a* but *the* Distinguished Service Medal for the kind of transportation we create. *From the Safety Message of the D. & R. G.*

LETTERS TO THE EDITOR

A SECOND LINE OF DEFENSE

Grand Rapids, Mich.

To the Editor:

The occurrence of a very bad accident which recently happened to a trackman who had worked on his section for a long period of years shows that even old and experienced sectionmen may listen with profit to the old axiom of railroading which every one of them ought to know and observe: In case you see that your motor car, lorry or handcar is going to be struck by a train and that you cannot save it without endangering your life, *run towards the approaching train,* taking a course parallel with the track. *Don't run away* from the train. Every trackman should remember this, as it may save him from serious injury; it may even save his life.

The trackman in question was helping lorry tie-plates on the main line and was using a handcar for this purpose. He and the other members of the crew were just beyond a curve when an extra train with ten or twelve cars, traveling at a high rate of speed, struck the handcar and demolished it. A high wind prevented the train from being heard until it was upon the men. All succeeded in getting out of the way except one man. This man was struck by pieces of the flying handcar. Had he run towards the train it is probable that he might have escaped injury entirely. As it is, he lies in the hospital with both legs, one arm and one wrist broken, besides being bruised and otherwise injured.

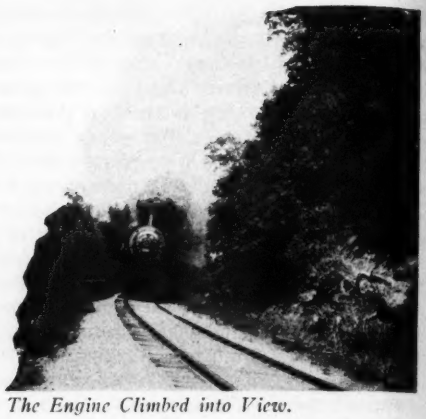
No section foreman expects that his car or lorry is going to be hit. His precautions are taken for the purpose of guarding against accidents of this sort in the first place. This is, of course, all very well and good and is the only sensible course to follow. But it is always within the realm of possibility that an accident may occur. And as a second line of precaution every foreman should instruct his men just what to do when it becomes apparent that their car or lorry is going to be struck. He should tell them not to obey the natural impulse to run away from the approaching train, but to take a course parallel or angling to the track and run towards the train. The men should keep these instructions in mind, prepared to follow them instantly in case of emergency. It is not likely that they will be called upon to observe them more than once or twice in their entire period of service, but when the emergency arises it is vitally important that they know exactly what to do. Charles H. Smith.

Student Chapters.—According to the February Proceedings of the American Society of Civil Engineers, that organization now has student chapters at 15 institutions.

SUBSTANTIALLY CORRECT

"The Brake Beam Was Removed and the Train Proceeded in Safety to Its Destination"

BY CHARLES H. SMITH



The Engine Climbed into View.

"FORTY-FIVE in the east. Something's coming," remarked Foreman Douglass to his men as he glanced up from his task of lifting a low joint in the main line a half mile west of Hilltop Siding and noted that the automatic block signal had dropped. "Nothing due—must be an extra," he added as an afterthought. A few minutes later the block went to a horizontal position and a smoky blur appeared over the top of the hill. Slowly, with stubborn exhausts, the engine climbed into view—first a plume of smoke and steam, next the smokestack and boiler-head and then the pilot. The grade was a steep one and a tonnage train always experienced some difficulty in making the hill. Two minutes elapsed while the engineer continued his struggle to make the grade and then the plume from the smokestack billowed into a cloud and the freight train stopped.

"He can't make it—he's stalled," opined one of Douglass' men.

"No, it isn't that," replied the foreman. "He's on top of the hill, all right. He has stopped for something else. He may have a meet at Hilltop."

The trackmen watched to ascertain the cause of the stop, and soon they knew the reason. Half way down the line of cars they caught sight of the blue smoke from a hot box and a few minutes later they saw the conductor and his brakemen walking towards it, carrying a pail of dope and empty pails.

"I wonder where they'll get the water to cool that hot box," remarked Douglass meditatively, as he suddenly became interested in the trainmen's actions. "Maybe they are the very fellows who emptied our water barrels at the cattle pass."

He was not left in doubt very long. As he watched he saw a brakeman go to the barrel at one end of the wooden trestle that spanned the pass, and dipping his pails in the barrel, fill them and then return to the hot box and throw the water into it. He then returned to the barrel and dipped up more water and repeated the cooling process. For a minute the foreman watched him in silence.

"That's pretty good!" he exclaimed after the brakie had made the third trip to the barrel. "They nearly emptied them two nights ago; we hauled water to fill them only this morning—and now they are taking it again! They've got a whole tank of water on the engine, but they won't carry it from the head end. Instead, we must haul it for two miles in cans on our car, and then they pull up to the barrels and dip it out to cool hot boxes! Pretty good, I'll say! I'll just write a little message and see if we can't have this thing stopped."

When the train pulled past him Douglass took the engine number. Putting the car on the track, he rode up to the cattle pass to verify his observations. One of the two barrels which he had filled only three hours before was over half empty. A bunch of greasy waste beside the track and a soaked portion of the roadbed told the rest of the story.

That noon when Douglass went to dinner he filed a message with the telegraph operator in which he related what he had seen, giving the extra's engine number and direction. Out of curiosity, more than anything else, he ascertained from the telegrapher that Conductor Wellman had charge of the train and was, therefore, responsible for taking the water from the barrels.

Two weeks later when Douglass and his men were working on the siding at Hilltop it happened that an extra pulled in to let No. 1 and No. 2, passenger trains which met at Sawyer, the first station east, go by. When the freight train was in the clear the conductor started from the caboose towards the head end, looking over his train. As he drew near Douglass recognized him—it was Wellman.

"I hear you wrote me up, Douglass," said Wellman stiffly as the two men met.

"Yes, I did. We can't stand for you fellows continually emptying our water barrels to cool your hot boxes," answered the foreman firmly. "You've got a tank full of water on your engine. We have to haul the water in those barrels for two miles."

"Well, that's a d——d fine thing to report a man for —taking a few pails of water from an old water barrel," exploded the conductor, who had received fourteen days' overhead suspension for his offense.

"That's all right, Pardner, but you must remember that I'm responsible for keeping those barrels filled. They are kept filled to protect the cattle pass in case of fire—not to cool hot boxes. And if you or any other trainman takes water out of them and I know it, I'll have to report you again."

"All right, Old Timer. Wait until a trainman gets something on you. See what happens."

"That's all right, too. I don't want to turn you fellows in—don't like to do it. But I've got to protect myself, and if you want to make it necessary for me to report you, why, I'll have to do it. But I won't report you unless it is necessary, Wellman."

Wellman nodded grimly. "I'll get even with you, Douglass—see if I don't!" he retorted angrily as he turned and continued his way towards the head end.

The section foreman did not reply to this. He felt that if he had won the unmerited animosity of the conductor it concerned him but little. He would, of course, rather have his friendship than his enmity, but if he had to choose between a slavish silence with the conductor's friendship and a just expression of his attitude with the conductor's enmity—why, he would choose the latter by all means.

So it was that during the next two months Douglass knew who was making the petty reports which caused him to receive messages regarding alleged rough spots in the track, switch lamps not burning, imaginary defects in the switches and other imagined defects in the track. Each message was immediately answered and the track was O. K.'d. It was annoying to the foreman, but he thought that Wellman would soon tire of his game. In

this he was mistaken. The conductor apparently never missed a chance of reporting every rough spot or other track defect that he could imagine.

Such was the state of affairs between Wellman and Douglass on the 20th of February. On that date Douglass and his men had been working at the east end of the section and had just placed the motor car on the rails to go west. "Something coming—block is yellow," announced the man, looking behind when the car had started. They continued towards Hilltop, passing one signal after another. "Block's red now," said the man keeping watch behind. They were going to work on the curve just east of Hilltop and Douglass decided that they could make the set-off ahead of the train. Arriving at their destination, they set the motor car off the track and prepared to begin work.

The train, Extra 5347 West, swept past the men and started to round the big curve and climb the steep grade into Hilltop. The engine was making between fifteen and twenty miles per hour as it passed the trackmen, but the combined obstacle of grade and curve retarded the speed until when the rear end came along the speed was reduced to seven or eight miles per hour. Four cars ahead of the caboose Douglass noticed something bumping along just ahead of the rear pair of trucks on a gondola heavily laden with billets of iron. A glance told him that a brake beam had dropped down and was dragging along on the rail almost under the wheels. The apposite end of the brake beam was dragging along on the ties and plowing a furrow whenever it struck the roadbed. Douglass knew that if the brake beam should get under the wheels—and this seemed an imminent probability—that the train would undoubtedly be derailed. Without a second's hesitation he began swinging the train down. There was no possibility of the engineer's seeing him, as the head of the train was far around the curve, but the caboose was only four car lengths away and Douglass thought the conductor or brakeman might see him.

But no one was in sight on the caboose as it drew alongside the trackmen and when the rear end came opposite him Douglass swung himself to the steps and entered the door. Inside at his desk sat Conductor Wellman. Up in the cupola sat the brakeman reading.

"You've got a brake beam down on the fourth car ahead. It is almost under the wheels. Better stop your train and take it down, or it is likely to derail the rear end of your outfit," said the foreman, addressing the conductor.

Wellman looked up in surprise from the wheel report he was making out. Seeing Douglass, he scowled. "If we stop here we can never make Hilltop Siding for No. 1 and No. 2," he said somewhat belligerently, as if the foreman were somehow to be blamed for the state of affairs. "We'll have to double the hill, sure."

"And if you don't stop here you may block the main line for ten or twelve hours," rejoined Douglass. "That brake beam is in bad shape. I advise you to pull the air immediately."

Wellman's scowl deepened. He disliked receiving advice from Douglass intensely. "Open the air on him, Bill," he said surlily, addressing his brakeman.

The brakeman went to the caboose platform and opened the valve on the end of the air line. The hissing sound of escaping air was shortly followed by the gradual setting of the brakes and the train came to a halt. Grabbing wrenches and hammers, the conductor and brakeman went up to the car where the brake beam was down and in ten minutes had loosened the tangle of rods, rigging and beam and dragged it to one side of the roadbed. Wellman looked at his watch.

"One is due in twenty minutes," he said to his brakeman. "Go back and flag 'em. I'll go up to the head end and see if the hogger can start 'em. If he can't, we'll have to double the hill."

The brakeman went back to the caboose to get his red flag and Wellman started for the head end. Five minutes later the engineer whistled off and attempted to start his train. But with the double handicap of grade and curve he could not even take the slack out of the long string of cars. He tried a second time, however, and then Wellman came back and cut the train and the engine started up the hill with the head end.

The trackmen could not see the maneuver, as the cut was made just around the curve from them, but they knew what was being done from hearing the engine working. The caboose was only a few rods ahead of the place where they were working, and as they jacked up the track and "shot up" the low joints they could hear the clanking of the brakes as the air leaked off. More than once they looked towards Hilltop to see if they could see the smoke of the engine which would indicate that it was coupling upon the rear end of the train. For the first cars of the rear end were around the curve and the trackmen had to depend upon their hearing to tell them when the engine coupled on to the second cut. But finally the caboose started to back up very slowly.

"He must be coupled on now," said one of the men. "The caboose is moving."

"Yes—he's got hold of them now," agreed Douglass. "He won't hold No. 1 very much. He will be clear in 7 minutes."

The rear end of the train continued to advance upon the trackmen, causing them to get out of the way. Each second the cars gained momentum. "Why doesn't he stop 'em?" asked the foreman in wonder as the cars continued to back past the men. Each minute they expected to see the string of cars halted with a jerk. Instead, the train continued backing past them. Then the head end of the string finally swung around the curve. There was no engine on it! For a second they stared unbelievingly. Then Douglass ran to the nearest car, caught it and started climbing up the ladder to the roof.

"Come on, men!" he called as he began turning a brake wheel and setting the brakes. The trackmen needed no second invitation, and boarding different cars they nimbly climbed to the car tops and began setting the hand brakes. One after another they set, going from car to car, and in a few minutes the string of cars began to lose headway. The trackmen continued running over the car tops setting the brakes, and half a mile down the track the rear of the freight train came to a standstill. The startled brakeman standing beside the track with his red flag waiting for the passenger train gazed at his caboose in wonder.

"Go back!" yelled Douglass from his position on a car top. "Go back and flag No. 1. Your rear end got away. Air leaked off. Beat it and stop 1!"

The flagman turned and ran eastward. Ahead over the shoulder of the cut appeared the smoke of the returning locomotive. Cautiously it crept around the curve searching for the missing rear end. Then when the engineer caught sight of the remainder of his train he accelerated speed until he reached it, and Wellman, jumping off, made the coupling.

Then the conductor climbed to the top of the head car and began releasing the hand brakes. "Let's help him out a little men," said Douglass, and mounting to the car tops the trackmen began releasing the brakes which they had so recently set.

Douglass and Wellman, working towards each other in their task of releasing the brakes, met near the middle

of the string of cars. When the last brake had been loosened the trackmen and the conductor descended to the ground. The conductor gave the engineer a high-ball.

When the signal had been acknowledged he turned to the foreman. It was plainly apparent that he was apprehensive of the action that Douglass might take.

"Going to say anything about this, Douglass?" he asked.

"Do you think I ought to?" countered the foreman. "No, this little slip-up of yours doesn't concern me. It's past—nothing serious resulted—so we'll forget it."

A look of relief came over Wellman's face. "I admit I pulled a boner by not setting the hand brakes. I sent my rear man back to flag No. 1 and the head man went up to flag No. 2, and being alone, I thought the air would hold 'em until we could get back with the engine. I wanted to save all the time I could. And I want to apologize to you, Douglass. I've been pretty ornery since the time you turned me in when we took the water from your barrels. You were right then and I was wrong—I acknowledge it. Will you let bygones be bygones, Douglass?"

"We all make mistakes, Wellman," answered Douglass. "Shake."

This ended the incident so far as Douglass was concerned. But a month later there appeared in the company's magazine under Roll of Honor a short item. It read as follows: "Conductor Wellman reports that the quick action of Section Foreman Bert Douglass undoubtedly prevented a bad derailment near Hilltop Siding on February 20th. On this date Foreman Douglass was working on his section a mile east of Hilltop Siding when Extra 5347 West passed him. Inspecting the train as it pulled past him, Mr. Douglass noticed a brake beam dragging and promptly stopped the train and notified Conductor Wellman of the condition. The brake beam was removed and the train proceeded in safety to its destination. Foreman Douglass' alertness and decisive action in stopping the train undoubtedly prevented a bad accident."

Douglass smiled cryptically when he read this. "I guess that account is substantially correct, anyway," he remarked to himself as he closed the magazine.

DRIVING HOME THE LESSON OF ECONOMY

THE HIGH COST of all materials used by the railroads has placed an entirely new significance on the problem of instilling the idea of economy in the minds of railway employees. This was the prime object in the organization by the Chicago, Milwaukee & St. Paul some months ago of a reclamation committee which directed its efforts primarily to the education of the employees in the necessity for rigid economy.

This committee, the initial work of which is reported in a previous issue of the *Railway Maintenance Engineer*, has conducted a considerable amount of its work through the aid of posters like those which are represented herewith.

H. S. Sackett, assistant purchasing agent, Chicago, Milwaukee & St. Paul, is the chairman of the reclamation committee and, being himself a timber expert, he has felt that the track forces have not had a sufficient appreciation of the increased cost of the track tie, and with the idea of driving home this lesson he has arranged for the distribution of posters like one of the two shown, which discloses in no uncertain terms what an enormous bill the railroads must pay each year for its ties. This sign is 18 in. wide by 24 in. high and is printed in red letters.

SAVE MATERIAL

DON'T OVER ORDER

Over-ordering creates SURPLUS and Surplus tends toward carelessness and waste of material.

DON'T BE CARELESS

The little things which you pass by each day may seem small, but the little saving is what makes the large total.

Don't make a guess at material and call it SCRAP, just because its present condition may warrant that conclusion. Remember, we are doing things today which were never done before in the way of RECLAIMING MATERIAL.

Don't forget that the proper spirit behind an incentive to work carries with it the desire to adapt yourself to the work in a businesslike manner. When you have done this you are not going to waste material.

Give your suggestions for Saving material to

The Reclamation Committee
Chicago, Milwaukee & St. Paul Railway Co.
1514 Railway Exchange, Chicago, Ill.

STOP! LOOK! LISTEN!

ATTENTION! TRACK MEN!

Do you know that a wooden cross tie now costs **One Dollar and Seventy-Five Cents** by the time it is placed in track?

Do You Know that the Chicago, Milwaukee & St. Paul Railway Company uses **Over three million cross ties per year?**

This great expense can be reduced by—

1. Making careful examination of ties in track before ordering, and only order ties actually needed.
2. Protecting stock piles against fire by removing grass and weeds around piles. Water barrels should be maintained in tie yards at stations.
3. Removing all old and rotten ties from right-of-way. They breed disease in other ties.
4. New ties must be properly cribbed up and bark removed before piling.
5. Do not remove ties that will last a year or longer unless they endanger safety of track.
6. Do not use picks, bars or hooks in testing or handling ties.
7. Use the oldest ties first.

Take care of the Cross Ties and the Dollars will take care of themselves

THE RECLAMATION COMMITTEE
1514 Railway Exchange Building, Chicago, Ill.

CONSTRUCTION METHODS AFFECT MAINTENANCE*

Uneven Settlement, Irregular Heaving and Depressed Sub-Grade Demand Attention from Track Forces

BY R. E. KEOUGH

Assistant Engineer Maintenance of Way, Canadian Pacific, Montreal, Que.

WHILE the roadmaster is supposed to be purely a maintenance man, he is such only where roadbed is old and well ballasted. After construction the track is turned over to the maintenance of way department with the expectation that construction days are over. This is usually erroneous, as it is generally found that construction as practiced on this continent is only well commenced when the maintenance of way department takes charge. Sufficient attention is not given to proper drainage to cuts or crowning and settling of fills. The present practice of hurried construction work calls mostly for machine work, such as train filling from steam shovels, or heavy blasting, all of which tend to lower the cost of construction. Soundings may be made to determine the depth of muskegs, but aside from this no such accuracy is used in building roadbed as is followed in bridge construction.

The construction engineer merely hopes to see the earth's crust stand up under the heavy wheel loads. Although it does this to everyone's satisfaction in the majority of cases, there are numerous instances where the roadbed is found to be anything but desirable. These are places which cause much worry to the roadmaster and maintenance engineer. If they are ever entirely cured it is only after long years of constant work. Ideal construction would mean that such places would be broken down and the bottom found, when the grading was being done, rather than allowing it to do so gradually under several years of operation and maintenance. It is, however, certain that the greater portion of our present roadways would not have been built had permanent roadway construction been demanded at the time, owing to the great extra cost necessitated. Oftentimes cuts are taken out or fills made which are scarcely passable even for light construction equipment, which will in no degree cope with the heavy traffic which is to follow.

A Stretch of Canadian Track Protected by Snow Hedges

EFFECT OF FREEZING

Lines have frequently been built and ballasted, but inspected while "frozen in," and pronounced satisfactory, when afterward the same road is found impassable. The roadmaster is often whipped over the back for rough track caused by such conditions as these and where money is available he must see to it that these original defects are corrected, either gradually or otherwise.

Although improper construction shows up in any part of the continent, it is perhaps more pronounced in the north, where frost enters deeply into the roadbed, causing excessive heaving, or in the gulf states and west coast, where rainfall is heavy during the winter months. Heaving spots must be carefully marked so they can be "dug out" during the summer months. Much care is needed when digging in order to avoid going too deeply, which will cause a hole that will ride as badly as the high spot did before.

It is usually found that roadbeds contain enough moisture in a climate similar to this to cause heaving by frost to a certain degree. It is only the irregularity of heaving that gives trouble. This is often noticed where we originally had open pit cattle guards, which were later filled up with clean ballast or cinders, which do not permit the track above it to heave correspondingly to the track approaching it. The result is we have shimmed track at such points, even on our oldest lines.

When making an inspection with a roadmaster some time ago he called my attention to two cattle guards which he had treated while foreman of that section several years before. He had, with two men, in one day, dug out all the ballast from two old pit guards and had back filled them with clay up even with the clay found in the adjoining roadbed. He then applied a similar depth of ballast to the track on either side. The result is entirely satisfactory, as it is found that these places have never given trouble since. There are still many such places which can be corrected on our roads equally as easily by observing trackmen who are given the money and labor to do the work.

POCKETS IN THE ROADBED

Since heavier power and wheel loads have come into use lightly ballasted roadbeds have been broken down, and in many cases the work has gotten entirely beyond temporary repair of the trackmen. I have in mind track over a bad clay table-land where the ballast has been pounded into the roadbed many feet in depth, forming great pockets under each rail, resulting in a cross-section similar to the letter "W." Although this line is well ballasted, with more being applied frequently, good track is not to be had, and, owing to the flatness of surrounding country, drainage cannot be had without heavy machine ditching. Relief may be given by literally burying the roadbed at such places under a heavy coating of cinders, burnt clay or other porous material, which will absorb the rainwater and thus prevent it from entering the roadbed.

Although usually we find such trouble confined to cuts, we also frequently find fills which have been built with a top dressing of impervious clay, which has become

*Abstracted from a paper presented before the Canadian Railway Club at Montreal in December, 1920.

pocketed by ballast. Such places on high fills, on being tapped, have expelled large quantities of water. The best results are obtained for such places by prohibiting water from entering the roadbed, either by a tile or French drain, or as mentioned above—a heavy coating of porous material over roadbed.

In the most northern states metal cattle guards are sometimes used, as well as wooden ones, both of which are left in over winter. The roadmaster soon notices the track does not stay as low under metal guards as it does with the wooden ones, owing to the steel guard permitting frost to enter easily, allowing track to heave a corresponding amount under them. Also he will find he can often save considerable shimming and rough riding track by putting temporary doors on culverts which are close to the surface, and where is is found the frost goes up from the culverts as well as down from the top of ballast, causing double heaving.

RAIL CREEPING

Another big problem for the roadmaster which has grown in magnitude since the universal adoption of heavier wheel loads and air brakes is rail creeping. Although road anchors are provided and almost universally used as a preventive for this, the roadmaster on the busier main line one way tracks finds that even when anchors are used they are at best only partially effective in holding rail, and it is up to the roadmaster to study each and every local condition on his subdivision in order to provide surplus expansion at certain points where his observations have taught him the rail is given to bunching.

His total expansion allowance per mile certainly must tally with that given by his table of expansion. Unless this method is carefully practiced it will be found impossible to retain even fair track and avoid future maintenance trouble on the heavier traffic main lines of the country.

You will not see kinky looking switches on the more observing roadmasters' territory. In fact, under normal conditions a switch should be the last to go out of line, as there are at this point four rails instead of two, as well as heavy timber, which make for better conditions. Such defects are the result of improper attention given to expansion on rail approaching the switch or hunching of rail at this point, which has been neglected through ignorance or shortage of labor.

The roadmaster who studies his conditions will know that frogs of all kinds, when used on highspeed tracks, will last and ride better where gage is kept snug. This is more important when frogs are located on inner rail of curves.

SUN KINKS

"Sun kinks," often described as acts of God and considered to be beyond the power of man to prevent, should, in the opinion of the writer, be put up to the roadmaster in the majority of cases. Practically every one is due to sheer neglect. The conditions leading up to trouble of this sort should have long before been discovered and corrected by him. They will be found to be the result of either improperly laid rail or the bunching of same, due to insufficient anchoring, etc.

The bunching usually occurs in moderately cool weather while joints are open. It naturally follows, therefore, that the majority of "sun kinks" show up the first warm days of spring when ballast is mellow and its adhesion to the ties is reduced. On down grades or one way tracks all such troubles can be further greatly reduced by insisting on surfacing and tie renewals being done up grade or in the opposite direction to the traffic.

In the discussion of this paper A. Crumpton, valuation engineer of the Grand Trunk, emphasized the years of anxiety and expense caused the maintenance of way department by lack of attention during construction to sub-surface conditions under embankments across muskegs, swamps, etc. In his remarks he stated that in making a sub-surface examination recently of 1,000 miles of railway in Illinois, Indiana and Michigan, 240 sink holes were found, ranging in depth from 10 to 70 ft. and containing from 100 to 100,000 cu. yd. of filling each, the aggregate quantity amounting to about 2,000,000 cu. yd. In most of these cases, in the first instance, a mattress of tree trunks, brush, etc., was laid across the soft spot and upon this the embankment was constructed. For years afterward, owing to the unstability of the embankment, frequent track lifting and constant watchfulness were necessary to fill the sink holes under the embankment. The grading of the lines referred to averaged about 22,000 cu. yd. per mile, with an additional 2,000 cu. yd. per mile for sink holes.

It is safe to say that, where the location of a railway can be reasonably considered as final, economic maintenance and operating requirements call for the filling of sink holes under embankments at the time a railway is constructed.

THE MAINTENANCE OF TRACK APPROACHES TO BRIDGES*

BY J. J. TAYLOR

Superintendent of Bridges and Buildings, Kansas City Southern, Texarkana, Tex.

THE maintenance of track approaches to bridges is one of the most important features in producing smooth and safe riding track, and requires more attention than any other part of the main line. Under normal conditions the track immediately approaching bridges is invariably the weakest, due to the fact that the dump end of bridges and trestles rests on concrete abutments or pile bents which, in either case, are comparatively solid. They have no more give or spring than the small amount of spring in the timber that is functioning between the concrete bridge seat or the cut-off on the piles and the base of the rail, while immediately off of and near the ends of bridges the dump is more or less subnormal and weaker than it is a few feet, or possibly a rail length, from the end of the bridge.

This condition is contributed to in several ways: The fill is almost invariably narrow near the ends of the bridge, due to a shortage of material to fill out the complete grade and ballast section. Sometimes the parapet walls of permanent structures are too short and sometimes the wooden headers of pile trestles are not long enough or properly maintained to support or admit of the full embankment and ballast section being maintained up to the end of the bridge. There are many cases where the dump immediately off the ends of bridges has never been filled out to the complete section, square up to the ends of the bridges, and it has worn and wasted away until there is not sufficient crown to support a complete ballast section. This renders poor support to the track at a point where it needs it the most. The track approaching bridges is subject to harder usage and pounding than any other point in the main line and it is invariably the weakest.

It has been my experience and observation that in many instances in ballasting or reballasting track, the raising of permanent bridges and long trestles to con-

*Abstracted from a paper presented before a meeting of the Kansas City Southern Maintenance of Way Association at Sulphur Springs, Ark.

form to the new ballast grade is avoided as much as possible because of the unsatisfactory results of placing wooden shims or wall plates on permanent bridge seats and piers. To overcome this, run-offs are made to conform to the present grade. In making these run-offs, the ballast gang frequently does not dig out sufficient material to get the standard section of ballast under the ties, but runs the raise up to the present grade of the track on the bridge, putting very little, if any, ballast under the ties approaching the bridge. This practice never proves satisfactory from a maintenance standpoint. Before the ballast is applied, the track should be excavated at least 6 in. or more, and preferably 10 in. of ballast put under the ties for a distance of at least 30 ft., or one full rail length from the ends of all of the bridges.

Trackmen or steel gangs laying or relaying rail should make it a point never to have a joint in the rail closer to the end of the bridge than the distance of a long quarter length—say, 8 to 10 ft.—as a joint in the rail immediately off of the end of a bridge not only weakens an already weak place, but often results in surface kinking and spoiling a good rail. In addition, there is an element of unusual danger in having a rail joint close to the end of the solid bridge, as the joint is likely to be swinging a little and the rail lying hard and solid on the end of the bridge, at the short quarter, is likely to break the angle bars or the rail. In either case the rail would "snake-head" to such an extent that it would be next to impossible for a train going toward the bridge to pass over the break without derailing.

Section foremen should give special attention to the maintenance of the track approaches to bridges. The track grade and level on the bridges should be maintained for a distance of one full panel or rail length away from the ends of all bridges. The ties should be drawn up snug to the rail with the track spikes and kept tamped as solid as possible with tamping bars or picks. Where the grade line on the bridge is higher than the track approaching the bridge and it is necessary to maintain run-offs, these run-offs should never start less than one full rail length away from the end of the bridge. The break in the grade should never start at the end of the bridge, but should, as stated above, begin well out on the dump, thereby giving a parallel level grade line approaching onto and leaving the comparatively solid ends of the bridge. With the run-offs or approaches maintained in this manner, when riding on fast moving trains, barring the different sound, one can hardly detect when they pass over a bridge.

French Engineers Standardize Rail Sections

AFTER an extended investigation six of the principal railroads of France have adopted four standard rail sections conforming to the general types of rails used in France. The principal interest in this step among American railway engineers lies in the information concerning French railway practice that was disclosed in the report of the investigation made by a committee of French maintenance of way engineers appointed to study this subject. The adoption of an American rail section was considered, but this plan was given up because the edges of the rail bases were considered too thin. In France the cross ties are dapped slightly to receive the rail and the shoulder of this notch is largely depended on to maintain the track gage. It is therefore important not to have a rail base with thin edges.

After examining numerous rail sections, the commission proposed the adoption of three types of rails previously in use:

A 36-kg. (79.4-lb.) type for standard-gage track with light traffic.

A 46-kg. (101.5-lb.) type for standard-gage with heavy traffic.

A 26-kg. (57.3-lb.) type for narrow-gage tracks.

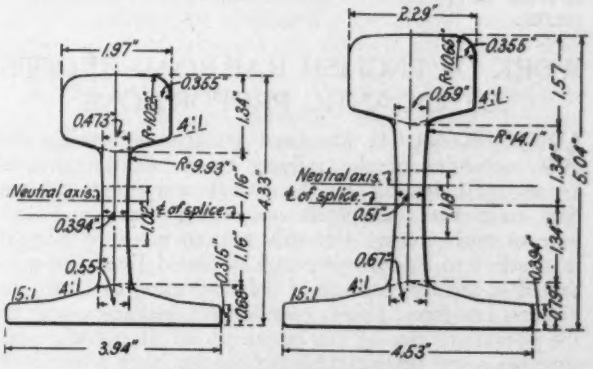
The three types adopted differ from the rails previously used in the inclination of the fishing surfaces, the thickness of the web and the dimensions of the base.

The original French iron rails had fishing surfaces with an inclination of 1 to 1. This inclination, which was found advantageous from the standpoint of good riding track, presented difficulties because of the high stress it produced in the joint bolts. When steel rails began to be made, in France, the inclination was reduced to 1 to 2, which was still considerably more than that used in other countries.

It was conceded that with a slight inclination the rail would be better supported. On the other hand, the wear which is necessarily produced on the bearing surfaces of the joint had the result of wearing out the fish plates faster. After a comparison the French railways adopted the inclination of 1 to 4 for the fish plate bearings.

Rails having thin webs have been used in France for some time. The metal in the web is more fragile than in the head and the base and cracks have frequently occurred in the bolt holes. Consideration was given to the fact that in other countries some railways have adopted webs having curved sides, thin in the part next to the neutral axis and thicker near the head and base. This arrangement facilitates rolling, and has been adopted for the French standard rails.

The old French rails have a rather narrow base and it was noted that in American rails the width of the base



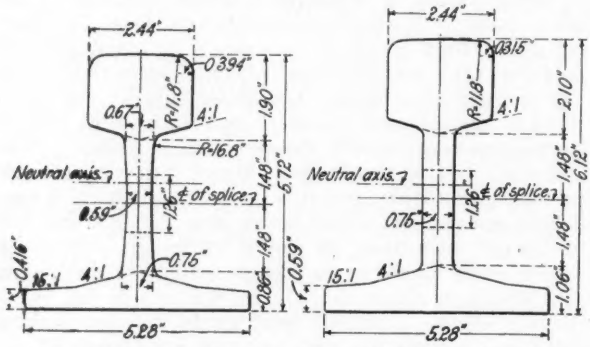
26-kg. (57.3-lb.) Rail, 36-kg. (79.4-lb.) Rail

is the same as the height of the rails (for some sections). It was concluded that the wider the base the better the bearing for the rail, but that this made the rolling more difficult. The French standards rails adopted are a compromise in this regard.

As regards the thickness of the base at the edges, 10.55 mm. (0.369 in.) has been adopted for the 46-kg. (101.4-lb.) rail and 10 mm. (0.394 in.) for the 36-kg. (79.4-lb.) rail, with the top face of the base having an outer portion at an inclination different from that of the fish plate bearing.

The railways also adopted a special section of 55-kg.

(121-lb.) for use in tunnels. Rails laid underground are subject to the action of moisture and smoke which cause them to deteriorate rapidly and their service life is short. To overcome this the heavy rail has been provided, which differs from the other types chiefly in the greater thickness of about 5 mm. (0.197 in.) of the head and base.



46-kg. (101.5-lb.) Rail, 55-kg. (121-lb.) Rail for Tunnels

The web is straight instead of curved, and its uniform thickness is 19 mm. (0.75 in.). The joint bars for this rail are the same as for the 46-kg. rails (101.4 lb.).

Track fastenings were also investigated. Numerous types of fish plates have been tried on the various lines with the object of improving the old ones, composed of two single flat bars designed to fit the fishing surfaces of the rails. These include fish plates with a rail base fixed to the ties, angle bars of various shapes and fish plates designed for rails with double heads, fish plates of large dimensions forming a sort of chair and fixed to the ties on either side of the joint, the long fish plates, etc.

These various forms have shown but little improvement on the flat fish plates, especially since the method of laying the rails with the joint ties as close together as possible has been adopted. As a consequence the older forms have been adopted as standard. However, the usual thickness has been increased to provide for a spacing of the joint ties of 42 cm. (16.5 in.) center to center.

WORK OF ENGLISH RAILROAD TROOPS OF GIGANTIC PROPORTIONS

WHILE MUCH has been written concerning the activities of the railway troops of the various armies participating in the world war, only limited data have been presented concerning the actual volume of such work. For this reason, no little interest is attached to a paper prepared by David Lyell and presented in the Proceedings of the Institution of Civil Engineers, London. This is essentially a detailed report of the operations during the entire period of the war and contains some pertinent figures on the large amount of work accomplished by the railway troops. The following excerpts from this report will be of interest to American railway maintenance men:

The type of track chosen was the British standard section, 75-lb. flat-bottomed rail, 36 ft. long, laid to tie plates and spiked to wooden ties 9 ft. long, 10 in. wide and 5 in. deep, the fish plates being the ordinary fish plate with four pear-necked fish bolts. This standard has been maintained throughout, except when in 1917 the available output of the rolling mills had to be supplemented by about 450 miles of second-hand 80-lb. Canadian track, which, being slightly worn, differed very slightly from the British standard section, and in addition to this, some 205 miles of second-hand track from the British railways.

The practice of using soft-wood ties gave rise to trouble in a few cases where bearing plates had been omitted, due to the spreading of the track in curves, but this was due to abnormally soft sleepers, principally American redwood. Another disadvantage more difficult to overcome was rail-creep on lines with one-way traffic. This was overcome to a certain extent by using screw spikes on three ties to the rail length, but in some cases anchors had to be laid in concrete.

As a great deal of joining up between British and Continental types of rails had to be undertaken, special compromise joints were made and kept in store. These were most useful during the advance of 1918.

At the beginning of the war full-sized die-squared soft-wood ties were provided, but later on, when timber became very scarce, ties of different classes of wood, such as beech and oak, were cut in the forests of France by the Forestry corps and handed over for railway construction. These were cut at all seasons and were usually handed over in a green state, the result being a few cases of split ties, as time did not always permit of boring before spiking, but the proportion of these split ties was so small that it was neglected.

The Broad-Gage Railway Construction department was responsible for supplying ballast for roads and light railway construction and maintenance, as well as for the broad and meter gage lines. The only ballast available in the north of France is sand from the dunes at Calais, and between Dunkerque and the Belgian frontier, and mine earth from the coal pits round Bethune. Chalk was also used as bottom ballast.

Mine earth (red) is the best ballast to be obtained in northern France (apart from stone). It is very hard, but rather brittle, and is not affected by the weather. It gives excellent drainage, holds up the road well, and is not expensive to load. Mine earth (black) is not satisfactory, and could only be used on temporary lines; owing to the effect of the weather it finally turns into mud. Its greatest advantages are the cheapness of loading, this being direct from the mine cars into railway wagons at the pit-head, and the large quantities available. It is most useful to spread over check-ballasted lines as camouflage.

Ordinary sand can only be said to be a fair ballast for sidings so long as it is covered by some other material which is not liable to be blown or washed away; it will not hold up against heavy traffic. Chalk is a very inferior ballast and was only used where nothing better was available. It held up fairly well when covered with ashes. The total quantity of ballast loaded during 1915-1919 was 9½ million cubic yards.

Some idea of the amount of work carried out by the Broad-Gage Railway Construction troops may be obtained from the following table which gives the actual number of miles of track laid during 1919-1919.

During the period from August to the end of December, 1918, 1,518 miles of line was restored, and to carry out this restoration 589 miles of new British track was used, the remainder being obtained by recutting and drilling damaged rails, or taking material from sidings which had not been destroyed.

Year	Material Laid in New Lines and Siding Miles	New Material Used in Reconstructing Destroyed Lines Miles	Total Miles
1914	1	..	1
1915	104	..	104
1916	417	..	417
1917	652	137	789
1918	709	589	1,298
1919	9	21	30
	1,892	747	2,639

MANY DEVELOPMENTS IN WAGE CONTROVERSY

Moves to Reduce Pay of Unskilled Labor and Hearings on National Agreements Occupy Attention of Wage Board

THE DEVELOPMENT in the present labor problem during the past month of paramount interest to maintenance of way department employees has been the initiation of controversies over the wages, particularly of unskilled labor, by practically all of the larger carriers. This action is in accord with the recommendations made some time ago by the Association of Railway Executives. It will be recalled that General W. W. Atterbury, vice-president of the Pennsylvania and then chairman of the Labor Committee of the association, asked the Labor Board on January 31 for permission to pay unskilled labor the prevailing rates in the territory in which they are employed, and that on February 10 this request was denied, the Labor Board holding that reductions made in the wages of unskilled labor could be made only after negotiations between the carriers and representatives of the employees or by order of the board after such conferences had ended in a disagreement. As a consequence of this ruling many of the railroads have initiated measures for reductions in the wages of both skilled and unskilled employes by asking for conferences with the employees of their roads. As was to be expected, these conferences have almost universally resulted in disagreements, following which the roads have appealed to the Labor Board. This program has been enacted on practically all of the larger carriers throughout the country, and two of these disputes have already been docketed by the Labor Board; the controversy between the New York Central and its unskilled employees being scheduled for hearing on March 30, and that between the St. Louis Southwestern and its unskilled laborers on March 31.

The indications from the conferences which already have been held are that the large majority of the employees, both skilled and unskilled, are unwilling to accept reductions at this time and that the controversies resulting, therefore, will be brought before the Labor Board for a decision. It has been generally supposed that when these cases were brought before the board it would, in the interest of all concerned, consolidate these cases into one hearing on the justness and reasonableness of the rates of pay established by its Decision No. 2 last July. However, the docketing of the New York Central and the St. Louis Southwestern cases indicates that this procedure will not be followed, at least for the present, and that therefore hearings in many of the controversies will not be held for some time.

It is significant, however, that the New York Central, in bringing the dispute with its unskilled laborers before the board, has asked permission to put a temporary decrease in effect on April 1 and to make the final decision retroactive to that date. It will be recalled in this connection that a somewhat similar procedure was followed on behalf of the employees when the board's decision of July 20 was handed down in that it made the increased rates retroactive to May 1, thus relieving the employees of the financial burden carried during the progress of the hearings. Similar treatment is now asked in behalf of a carrier, and if this request is granted it is probable that all of the carriers will be treated similarly and a general wage decrease will be put into effect in the near future.

HEARINGS ON NATIONAL AGREEMENTS

In the hearings on the demand of the employees for the continuation of their national agreements (reviewed in the last issue), the maintenance of way employees presented their rebuttal testimony on March 9, J. C. Smock, grand vice-president of the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers, devoting the first part of his testimony to the general contentions of capital and labor. He contended that in the employees' stand for justice and right, reasonable working conditions and a living wage, they have to contend not only against the railway managements, but against organized capital which is backing the railway managements. He devoted considerable space to veiled protests against the propaganda which is being circulated by "representatives of organized capital," alias chambers of commerce. Regarding the relevancy of this testimony, Mr. Smock stated that these organizations know nothing of the actual conditions and that this propaganda "is being circulated broadcast in reckless disregard of the rights of humanity." Distribution of this propaganda was taken to indicate the "desperateness of the case of the railroad managements."

Further evidence that there is a concerted movement on foot in this country on the part of organized capital and employers is found, he said, in the clamor that is being made before Congress for the letting down of the bars and flooding this country with cheap labor by amendment to the immigration laws. Furthermore, Mr. Smock charged that thousands of Mexicans have been brought into the United States within the past year and placed in direct competition with former employees of the railroads, in direct violation of law. This has been done, he said, for the purpose of lowering the level of the railway employees to the standard that exists in the country from which they came.

Mr. Smock quoted extensively from Dr. Frank Crane and Arthur Brisbane regarding the relations between capital and labor and the necessity for guaranteeing certain rights to common labor. In support of a national agreement, he stated, "An aggreement applicable to all railroads establishing uniform working conditions will have a tendency to encourage the employees to become steady workers, thus being an agency in preventing the fluctuation of labor, which is authoritatively considered to be a waste of energy and a genuine loss to the country as a whole."

Regarding the carrier's contention that representatives of the individual railroad companies are willing to negotiate agreements individually with their employees, Mr. Smock cited instances dating back as far as 1902 to show that the railroad companies have refused to meet the men in conference to arrange schedules of working conditions. The majority of these instances cited by Mr. Smock took place prior to 1915.

Following this Mr. Smock took up the carriers' seven specific objections to the proposed maintenance of way agreement, flatly denying the bases for these objections in the majority of cases, but without offering reasons therefor. His specific reasons for the approval of a national agreement followed in general the reasons which have been given by the other organizations, namely, that

they serve as a protection to the worker, thus creating contentment and efficiency, and that without them the carriers would again begin indulging in alleged sharp and evasive practices.

LABOR BOARD SUMMONS RAILWAY EXECUTIVES

On the insistent demand of Frank P. Walsh and B. M. Jewell, respectively counsel and spokesman for organized railroad labor, Robert S. Binkerd, assistant to the chairman of the Association of Railway Executives, General W. W. Atterbury, vice-president of the Pennsylvania and chairman of the Association's disbanded labor committee, Carl R. Gray, president of the Union Pacific and a member of the labor committee before its abolishment, and Thomas DeWitt Cuyler, chairman of the Association, were summoned by the Railroad Labor Board to appear before it on March 18 as witnesses on the hearings on the demand of the employees for continuation of their national agreements. In addition the following, all members of either the old labor committee or the Conference Committee of Managers of the Association, have been notified to hold themselves in readiness for a similar call: Hale Holden, president of the Chicago, Burlington & Quincy; C. H. Markham, president of the Illinois Central; H. E. Byram, president of the Chicago, Milwaukee & St. Paul; W. G. Besler, president of the Central Railroad of New Jersey; E. E. Loomis, president of the Lehigh Valley; J. H. Young, president of the Norfolk & Southern; J. H. Hustis, president of the Boston & Maine; N. D. Maher, president of the Norfolk & Southern; W. R. Scott, president of the Southern Pacific, Texas and Louisiana Lines; J. W. Higgins, executive secretary of the Association of Western Railways; C. P. Neill, manager of the Bureau of Information of Southeastern Railways; A. W. Trenholm, vice-president of the Chicago, St. Paul, Minneapolis & Omaha, and J. G. Walber, secretary of the Bureau of Information of Eastern Railways.

Mr. Binkerd was requested to bring with him the minutes, letters, recommendations and other records having to do with the proceedings of the Association and its labor committee with reference to the dispute now before the board.

These developments were brought about by the adoption of resolutions by the board on March 14 after Mr. Walsh and Mr. Jewell had stated in substance that "it will be impossible for us to proceed with the presentation of our case until the witnesses we have called for have been subpœnaed and have presented themselves for examination."

By the testimony of these witnesses Mr. Walsh endeavored to prove:

1.—That national boards of adjustment and national agreements are inseparable.

2.—That railway executives are divided on the question of national boards of adjustment and therefore on national agreements.

3.—That Mr. Cuyler and General Atterbury, alleged representatives of capital, have exerted a powerful influence in opposition to national agreements as part of a general attack upon labor organizations.

4.—That the carriers are organized nationally to treat labor and other problems and they therefore should treat with the employees nationally.

5.—That the basic prinicples of the national agreements are just and reasonable even when applied nationally.

6.—That the railroads are unfairly moulding public opinion—the power of the Labor Board.

7.—That the labor policy of the railroads is dictated by a handful of executives.

8.—That the Association of Railway Executives and its officers wield more than an advisory power.

However, this examination failed to establish any new facts in this regard and developed anew that the universal application of rules regarding working conditions is impossible without a loss of economy and efficiency, demonstrating that the only agreements which are practicable are those made between the men who work under them and the men who are responsible for their application.

The labor leaders will continue the cross-examination of witnesses, W. G. Besler, president of the Central of New Jersey; E. E. Loomis, president of the Lehigh Valley, and H. E. Byram, president of the Chicago, Milwaukee & St. Paul, having been summoned, at the request of Mr. Jewell and Mr. Walsh, to appear before the board on April 4.

MR. JEWELL'S "BILL OF RIGHTS"

When this phase of the hearings opened on March 18, Mr. Jewell read a "bill of rights," outlining the basic principles upon which the national agreements are based and for which the employees' representatives are fighting. This statement said in part:

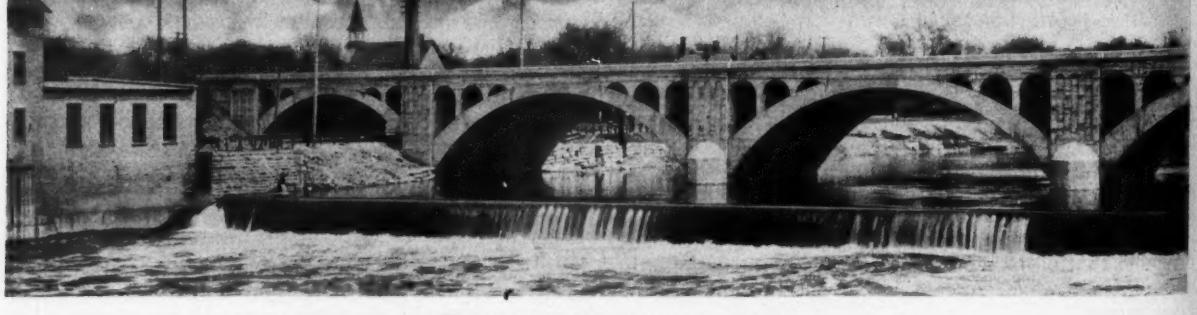
"The fundamentals upon which the national agreement is based are few in number and consist of only those elementary principles and safeguards which enlightened public opinion has fully sanctioned and officially declared as necessary to the well being of the men.

The fundamentals which are the basis of the national agreement are as follows:

Eight hours as the recognized measure of the standard work day with an adequate hourly wage.

Payment for time worked in excess of the regular eight hours at proper over-time rates for the various characters of service required.

The beginning and ending of working shifts to be so arranged as to permit of reasonable living arrangements by employees and their families.



An Example of Esthetic Bridge Design

Reasonable rules for the protection of health and safety of employees.

Clear and concise definition of the work of each craft to be performed by mechanics and helpers.

The formulation of apprenticeship rules so as to develop sufficient, competent and efficient mechanics.

Applicants for employment as mechanics to be required to show that they have served an apprenticeship of four years or performed mechanics work for a similar period and they not to be denied employment, when their services are needed, for any reason other than their inability to perform the work for which they are making application for employment.

The right of the majority in each craft to determine what organization shall represent them. This organization to have the right to make an agreement which shall apply to all workers in the craft.

The right of the majority of each craft on each railroad to select a committee or representatives who shall handle all grievances which may arise affecting all employees of the craft in accordance with the provisions of the agreement.

Craft, point seniority, limiting seniority to the local shops or points and not permitting interchange of seniority with other shops, crafts, or departments of railroads.

The right to organize and the protection of employees against discrimination because of membership in labor organizations or for any other reason.

"These fundamentals constitute the irreducible minimum in labor's bill of rights. If machinery is to be successfully established for the peaceable settlement of the disputes between management and employees on the railroads these fundamental principles are an absolutely necessary preliminary. Industrial peace can only be maintained when the cause of industrial war is removed. Uninterrupted railroad service can only be had when management deals fairly with employees. Declaring strikes unlawful will not avoid strikes—removal of the cause is the only safe and sure remedy. Railroad employees are law-abiding and peaceable citizens, they ask no special favors, they demand only and are entitled to a square deal. They will not willingly submit to less."

As a part of the public which, through freight and passenger rates, pays all railway expenses, the National Industrial Traffic League on March 15 filed a petition of intervention in the case involving national agreements. It charged that many freight rates are now so high that they are destroying business; and that the high rates are chiefly due to excessive pay rolls of the railways. It maintained that the board was created to represent the public as well as the railways and their employees, and that therefore the public has a right to be heard. The Illinois Manufacturers' Association and other state organizations of manufacturers joined in the National Industrial Traffic League's petition.

Erie Ordered to Withdraw Wage Cuts

The action of the Erie in ordering reductions in the wages of its track laborers and the deduction of one day's pay from all employees, without negotiation with the men affected, was condemned by the Railroad Labor Board in a decision dated March 2 and announced on March 7. This decision found the Erie guilty of violating the board's Decision No. 2 on six counts and denied jurisdiction in the controversy over wages until proper conferences have been held and a disagreement reached.

The Erie later withdrew all its wage reductions in conformity with the decision of the Labor Board and the road is now reducing forces in practically every department in order to make the necessary reductions in operating expenses until such a time as the adoption of lower wage scales will permit of an increase in the number of employees.

Board Reaches Decision in Short Line Case

The board's decision on the demand of employees for the application of the rates of pay fixed by Decision No. 2 to employees on the so-called short lines was announced on March 28, although the decision was dated March 16. This finding dismisses the dispute because of the board's inability to determine just and reasonable wages in view of "the varying work done under infinitely varying conditions by the 4,000 employees of the carriers party to the dispute.

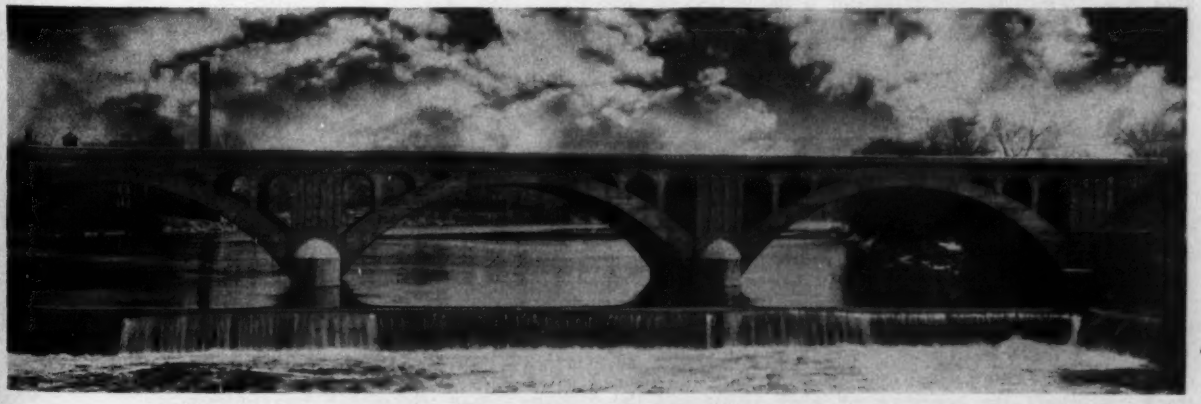
This is the first time that the board has given recognition to the contention that varying local conditions are a factor in the determination of just and reasonable wages, and to a certain extent backs the position taken by representatives of the carriers in the controversy over national agreements.

It is evident in the announcement which accompanied the board's decision that such an interpretation would be placed upon this statement, for the following paragraph was appended:

"This statement is to be understood as applicable to the circumstances of this dispute as to short line employees and not to be taken as indicative of the board's view as to appropriate action as to conference in another dispute now before it as to rules and working conditions on standard railways."

Nevertheless the fact that this case has been dismissed because of the impracticability of fixing just and reasonable wages, in view of varying local conditions, will undoubtedly serve as a precedent and will exert an influence in the final decision in other disputes now before the board.

A. B. & A. Ry. Restores Service—Local passenger and freight train service has been restored on all parts of the Atlanta, Birmingham & Atlantic Railway lines, following a general strike of employees March 5. The officers of the railroad state it is expected that through passenger and freight train service will be resumed shortly.



The Illinois Central Bridge at Kankakee, Ill.

SOME ESSENTIALS IN MESSAGE WRITING

Brevity Is Important, but the First Requirements Are Completeness and Clearness

BY CHARLES H. SMITH

THE AVERAGE track foreman writes many messages during the course of a year. He may send some to the division superintendent, a lesser number to the division engineer, a few to the division accountant, but by far the greatest number of his telegraphic communications are addressed to the roadmaster or the supervisor under whom he works. However, these officers are not the only persons to whom he sends messages. Occasionally he sends a message to the maintainer having supervision over the automatic block signals on his section, or he may send a message to another foreman regarding work to be done jointly, or to the conductors running the locals and the work trains. From time to time it may be necessary for him to wire the motor-car repairman regarding his car. From this it is readily seen that the aggregate number of messages sent during the year reaches quite a large total.

Broadly speaking, there are two kinds of messages which foremen file with the telegraph operator—good messages and bad messages. The good messages are the ones that are explicit, accurate and brief. They tell the receiver everything it is necessary for him to know—and nothing more. Furthermore, they tell it in the fewest number of words it is possible to use and still express clearly what the sender wishes to convey. When the receiver reads the message he has all the information he needs in order to take the action requested by the message. He does not have to write a message to the sender asking "what, why, when or how many," thus making it necessary for the foreman to write still another message explaining something he failed to state clearly, omitted entirely or stated inaccurately in the first message. Instead, with a good message, immediate action is possible and business proceeds smoothly and without delay.

The bad messages are the ones which fail in one or more of the points enumerated above. They are ambiguous or inaccurate or wordy or incomplete. It is quite common to omit some important point. Almost always they call forth a message from the person to whom they are addressed, asking about something which in nine cases out of ten could and should have been included in the original message, or inquiring about a part of the message it is impossible for the receiver to understand. In the meantime the subject of the message hangs in abeyance. This, of course, causes a delay that is entirely unnecessary.

If the bad message happens to refer to track conditions, the chief dispatcher or the superintendent must wire the foreman in order to ascertain the necessary facts before action can be taken. If it is to the motor-car repairman he must wire the foreman for further details before he starts out so that he can bring the necessary repair parts and tools with him. And so it is with the others who receive the ambiguous, the inaccurate or the incomplete message. All are put to the trouble of writing a further message to obtain the information necessary, thus burdening the wires with messages which ought not to be necessary and delaying the business at hand also.

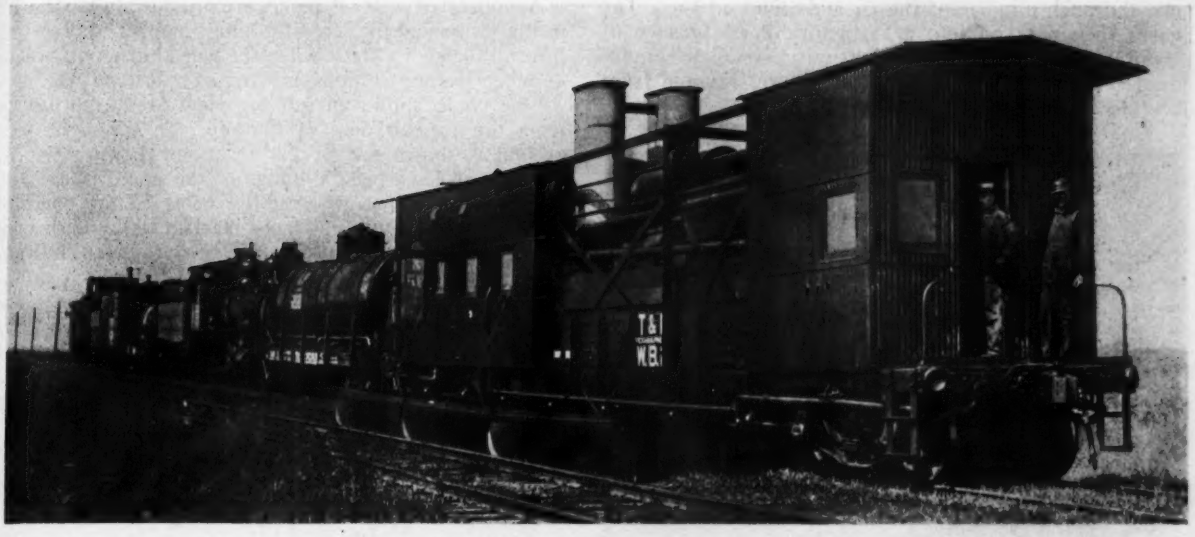
But delay to work and unnecessary work are not the only bad results due to bad messages. Those regarding track conditions, the operation of work trains and the position of slow flags may be a source of danger to trains. In this class of messages having to do with train and train movements it is especially necessary that the meaning be made as clear as possible, specifying the exact track limits, exact time limits, the correct date and any other information that may be pertinent to the particular business at hand.

In this connection it is well to remember the many hands through which the message that refers to track conditions or train movements must pass before it reaches the men who are governed by the instructions it contains. The foreman writes the message, the local telegrapher sends it, the receiving telegrapher copies it, the chief dispatcher reads it and gives instructions to the trick dispatcher, the trick dispatcher formulates the substance of the message into a train order and various telegraphers copy the order as he repeats it over the phone. It is then given to the enginemen and conductors for their guidance. If the message is expressed clearly and completely, the information reaches the trainmen in a form they easily understand. If on the other hand it is lacking in some essential feature or is capable of being wrongly interpreted, there is always a chance for it to be understood wrongly or to be garbled by some one of the men who handle the message.

Every message of this nature is read by from four to eight persons. It is written out at least twice. A message unnecessarily long or containing extraneous matter thus unnecessarily consumes a fraction of the time of from six to ten persons. Good messages save time and energy.

When writing messages foremen should keep in mind a few points and apply them to their communications and thus avoid accidents, delays and explanations. First, make the message clear, accurate and brief, but make it complete. When you have written it, re-read it and ask yourself if it is possible for anyone to misunderstand it. Have you told everything it is necessary to tell? Second, always make a carbon copy of all messages you file—and take care of the carbon copy. Then in case of any misunderstanding you will have a copy of the original message to which you can refer. Third, file messages at the proper time. Don't O. K. track fifteen minutes to an hour before it is really O. K. and don't wait until several hours after it has been repaired before filing the message. Or do not wait until you are entirely out of materials and then rush to the telegraph office and wire for whatever you need and expect to get it on the next train. Anticipate your needs and wire in advance—if you must wire—so that the roadmaster has some advance notice. Fourth, when you file your message, mark the filing time on both copies—the original one and the carbon. This may save you trouble some time should a question arise regarding the time the message was filed. Fifth, don't hesitate to use the wires whenever it is necessary for you to do so, and on the other hand don't burden them with messages that could go by railroad mail just as well.

A proper observance of these points will make for safety, efficiency and economy, insofar as they are dependent upon telegraphic communications.



The Weed Burner Train with Oil Cars, Locomotive, Caboose, Etc.

A High Power Weed Burning Plant

Example of Unusually Complete Equipment Designed to Destroy Heavy Growth of Vegetation

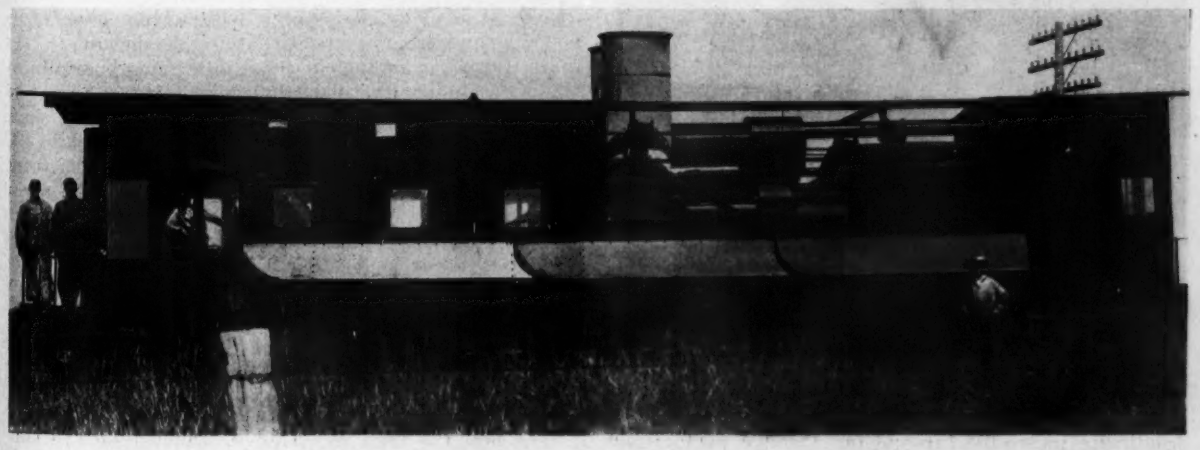
VEGETATION growing in the roadbed of the Texas & Pacific, particularly in the territory east of Fort Worth, adds greatly to the cost of track maintenance, and also retards train movement because of the difficulty in starting from sidings. Because of the fertile soil, moist climate and length of the growing season it is impossible to keep the track reasonably free from vegetation by manual labor.

After trying various methods of destroying the vegetation mechanically, a new type of apparatus for burning weeds was developed by E. C. Fogh and built in the Texas & Pacific shops. It is capable of destroying vegetation for a distance of 10 ft. each side of the center of the track and may be operated about five miles per hour.

Three men (taken from the maintenance forces) are required to operate the apparatus, and the equipment necessary, in addition to the burner, consists of a small locomotive, an oil tank car, a water car, a camp car for employees and a caboose. An oil-burning locomotive, having a tractive effort of 19,000 lb., was found entirely adequate. The fuel consumed by the locomotive and wood burner averaged about 60 gal. per mile and the total cost of destroying the vegetation was less than $5 per mile.

Vegetation is destroyed by the direct application of heat at from 1400 to 1500 deg. F., and experience has developed that this may be done with safety. The heat is blown upon the vegetation beneath a hood 38 ft. long suspended over the track, giving a length of contact sufficient to destroy vegetation while the burner is moving five miles per hour.

Oil is used for fuel, supplied through a burner, or atomizer, at the center of an ignition and mixing chamber to which the air needed for supporting combustion is supplied from forced draft produced from a steam turbine-driven blower and delivered through several tangential ports arranged around its periphery so as to give the air a rapid vertical motion with a consequent early

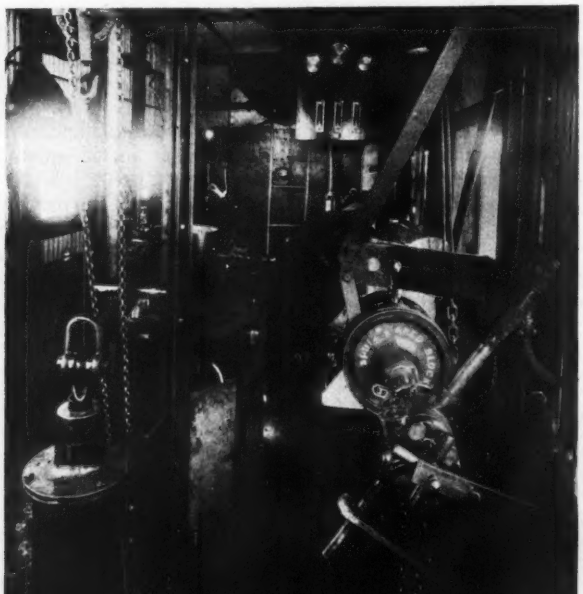


A Side View of the Weed Burner

and thorough mixture of the air and atomized fuel. The gases then pass on into a refractory lined furnace of about 180 cu. ft., where combustion is completed under most favorable conditions, at temperatures ranging from 2500 to 3000 deg. F.

View in the Rear Cab Showing the Ignition Mixing Chamber

From the furnace the gases pass at the rate of about 10,000 cu. ft. per min. through a cylindrical flue lined with refractory materials into a second mixing chamber, similar in arrangements to the first but larger, where air from another turbine-blower moving at the same rate



An Interior View Showing the Air-Driven Motor Hoist with Turbine-Driven Blowers in the Background

is mixed with the furnace gases through tangential ports. The mixture of furnace gases and air, then at a temperature of 1400 to 1500 deg. F., is forced through a down-pipe and horizontal distributing duct running lengthwise under the car and out through perforations arranged to distribute the heat under the hood evenly.

Air-operated safety dampers are provided in the flue immediately behind the second mixing chamber to divert the heat up through a stack when the weed burner is stopped or when passing stations, moving over bridges, etc.

One photo shows an interior view of the burner car from the forward end of the cab. In the right foreground is shown one of the air motor-driven hoist for raising and lowering the wings of the hood. Gages are located where they are readily visible to the operator, showing the pressure of forced blasts, of oil and of compressed air for wing hoists, and a pyrometer indicates temperatures. Bay windows are located on each side so that operators may conveniently observe the line ahead and adjust the wings of the hood to avoid obstructions. An emergency train line valve is also provided for each operator.

Another photo shows the ignition and mixing chamber and oil burner in the rear cab.

The apparatus is mounted on a steel underframe flat car lengthened to 60 ft. The machine is carefully designed to assure continuous operation at a low maintenance cost. Standard commercial equipment is used for parts subject to wear or breakage, thus minimizing expense and delay for repairs. The apparatus has proved successful in operation.

The Weed Burner with Hood Working in Position Covering Width of 20 Ft.

CEDAR TIES IN TRACK FOR 52 YEARS

THE HISTORY of the stretch of Chicago, Milwaukee & St. Paul track between North Milwaukee (formerly Schwartzburg) and Cedarburg, a distance of 14 miles, furnishes another of those interesting accounts of ties withstanding the disintegrating effects of time and service over extraordinarily long periods. Records show this track to have been laid as early as 1869, about 36,400 ties, 16 to each 30 ft. rail, having been used. Of these ties 35 per cent were cedar, 8 in. to 12 in. wide, about 8 in. thick and 9 ft. long, the remaining ties consisting of tamarack, hemlock, and in a few cases white oak, all of which were cut in 8-ft. lengths. At the present time, after a period of 52 years, about 2,000, or 15 per cent, of the original cedar ties are still in the track. The record is particularly complete in this case, because P. Neugent, the roadmaster responsible for this track, was section foreman on this part of the line from 1874 to 1878 and has since kept in close touch with it.

The first rail used was a 52-lb. combination rail consisting of an iron section carrying about one-half inch of

steel on the top of the head. After three or four years the steel of the rail began to peel off in long strips and in 1875 it was replaced with 56-lb. North Chicago four-inch rail. Shortly after this the 9-ft. cedar ties, about 13,000 in number, were shortened to 8 ft. and shifted the necessary six inches to line in with the other ties. In 1889 the track was relaid with 60-lb. rail, and in 1902 it was again relaid, this time with 75-lb. rail. The latter rail was tie plated in 1903 with "Servis" plates, a light steel plate, 5 in. by 7½ in. and having long ribs on the bottom side. Thus these ties withstood the ravages of decay for this long period and have also resisted the mechanical abuse resulting from repeated rail renewals with but very limited protection by tie plates.

Welfare Work Among Mexican Laborers

BY F. M. RICHARDSON
Railroad Secretary, Young Men's Christian Association, Chicago

THE Railroad department of the Young Men's Christian Association is now carrying on an experiment on the Rio Grande and the Albuquerque divisions of the Atchison, Topeka & Santa Fe in New Mexico that possesses much of interest to maintenance of way officers. In the more than fifty years since its first branch was established, the Railroad Association has discovered a way to supply the needs of men in every principal branch of railway service with the exception of that great body of men employed in maintenance of way. Upon this group of employees the association is now focusing its attention in an experiment seeking to discover the needs of these men as they obtain in the territory selected and is further seeking by experiment to determine how best these needs may be met.

As Mexican labor predominates in this territory, it was essential that the man selected to conduct the experiment have a speaking knowledge of Spanish. Other qualifications considered essential were a sympathy with the aspirations of the Mexican laborer, a teachable and inquiring mind, and a willingness to accept the hospitality of a lodging in the labor camps to be visited. S. L. Hernandez, an association secretary experienced in mining camp work, was the man selected.

In the fifth month of the experiment, as this is written, it is realized that the problem thus far has hardly been touched, and yet some very definite lines of approach have been worked out. These have been mostly through educational means. One of the first things that contact with these people reveals is a great hunger for knowledge. It is true that there are instances where individuals have apparently abandoned hope of any advancement for themselves, but among the fathers there is evident a great desire that their children may have what they have been denied. As illustrative of this, instances have been noted where several of the fathers take turns gathering up the children of the section on hand-cars before the day's work and conveying them half a dozen miles or more to a point nearest the nearest school. From that point the children walk across the plains to school, returning to the right of way at night to be picked up again on hand-cars.

Colloquial instruction in English, educational talks in Spanish and the distribution of carefully selected literature printed in Spanish are the three principal channels through which educational contacts have been made. This work has been done at visits to sections, to construction camps and while accompanying labor groups in transit.

A typical program for an evening spent at a section, with practically every man, woman and child assembled either in the section house or in the station waiting-room, is generally as follows: (1) A 20 min. musical program, using the phonograph; (2) an educational talk upon some subject of interest; (3) English instruction for the more ambitious of the men and for all the women and older children; (4) distribution of literature.

The musical records most in demand are band numbers. Mexican national airs and Mexican folk songs are largely used in these programs. The talk following the musical program gives opportunity for general instruction in Americanization, for a discussion of relations of fidelity to one's employer and many other topics related to the circumstances of their life and employment. Especially does the talk present an opportunity to promote a better international feeling by pointing out America's traditional policy in relation to neighbors as exemplified in its relationship with Cuba and the Philippines. It is a new conception to these people to think of America's relationship as one primarily of helpfulness and not of exploitation. The idea is different from that given them by political factions in their own country and by the press to which they may have had access. Articles in the better Spanish literature, published in Mexico and in the United States, are brought to their attention to substantiate this traditional attitude of America as opposed to statements in the incendiary literature that has reached them. When it is remembered that the unmarried men of these groups return by the hundreds to old Mexico as often as every six months for a short visit, this work cannot be without real significance in promoting a better international feeling among the people of their class.

The talks invariably lead to interviews in which both fathers and mothers seek counsel. As illustrative of this, Mr. Hernandez has been able to lead men to see the wisdom of accepting the company's offer of compensation in cases of injury rather than to follow other counsel previously given them advising that the injured employee sue. He has been called into family council over the parents' dilemma in handling an intractable son who, having grown sick of the isolation of home life and the absence of opportunity, has found himself in rebellion against parental rule and threatened dire things when at heart the boy was not criminal but only expressing in his untutored way a heart hunger for opportunity. Mr. Hernandez has been able to counsel the family on the problems confronting them in relation to the education of the children, upon thrift and why they should deposit their savings in banks. Unfortunately, the Mexican attaches the same suspicion to our American banks that he holds regarding the fidelity of those in old Mexico. Every problem in the range of personal and family problems seems to have been brought to him, each complicated by ignorance and yet each reflecting a desire for adjustment to the conditions that obtain on this side of the border.

In a day's work, Mr. Hernandez attempts to use both the noon hour and the evening, devoting his evenings to the larger section communities. To reach some of the points for these evenings with a section community some-

times means walking from section to section where passenger or freight trains may not be available at the time desired. Sometimes it means foregoing cooked food and subsisting on commissary. Sometimes in a crowded section it means a tramp to some ranch house miles beyond to get a bed, but these instances are the exception for, as a rule, the Mexican laborer is very hospitable though not very sanitary.

One of Mr. Hernandez' favorite talks is how to keep healthy. While this talk is primarily on personal sanitation, he devotes a portion of the talk to domestic sanitation for the benefit of the women present, urging cooperation on their part to keep the men healthy to do their work.

On cars in transit with labor parties to distant points, sometimes requiring a trip of several days' duration, a program similar to those for the section men's evenings is conducted at intervals when the car is at layover points or on sidings. The phonograph contributes much to the contentment of such a party. The literature is in demand on the part of the few who can read, while the talks are listened to attentively by all. These labor parties are made up mostly of immigrants from old Mexico. Instruction regarding how to live in America is eagerly received. Popular subjects are: How to Keep Healthy, Things to Eat, and How to Count Money. It is the opinion of labor agents who have observed the experiment as conducted on labor cars that this phase of the work for maintenance of way employees, if conducted generally, could be so helpful as to have an immediate reaction in lessening many of the difficulties in the work of these labor agents.

Thus far every effort has been experimental. There are many problems. New ones are constantly being presented as the experiment proceeds. There are also the usual problems to be met that obtain wherever personalities and human aspirations are involved. To these are added the problems presented by a foreign language, by isolation and, finally, the problem of finding a way in which the man may enter into the program as one who helps carry on and is not a recipient of benefits only. At present the line of procedure in conducting the experiment is an application of one of the basic Young Men's Christian Association principles in dealing with young men, namely to supply what a man needs most next.

A NOVEL COVER FOR ANNUAL PASSES

RAILROAD passes, membership cards, photographs and similar articles which are generally made of paper, and which have to be shown frequently, become bent, broken, torn and dirty from handling and carrying about in the pocket or in a leather case.

Such articles may be well protected by cementing the card between two pieces of transparent sheeting. This can best be done by spraying the pieces of sheeting with a solution of one-third wood alcohol and two-thirds amyl acetate and, after allowing them to dry for about ten minutes, to avoid blurring the ink, placing the card between them and uniting them under high pressure.

Satisfactory results can usually be gotten in a somewhat simpler way by coating the card on both sides with pyroxylin solution, using a camel's hair brush, and getting the adhesion to the sheeting by means of a heated hand roller, using a piece of blotting paper between the sheeting and the roller. The face of the passes shows through the sheeting. The card cannot be bent, torn or soiled. If it becomes dirty it is easily washed, as water does not injure it. This transparent sheeting is manufactured by E. I. Du Pont de Nemours & Company, Inc., Wilmington, Del.

RULES FOR HANDLING TOOLS

By H. B. WILSON

Maintenance of Way Master Painter, Bessemer & Lake Erie, Greenville, Pa.

THE FOUNDATION of economy and safety in the handling of tools falls principally upon the foreman who supervises the use of them. He should personally inspect all the tools and know that they are in good condition. In the selection of his outfit he should incline towards durability rather than lightness, as the bulky tools (after getting accustomed to them) will do as good work as the fragile ones with a big saving of time and money in the end.

The proper use of tools requires that the foreman must school the men in pride in taking proper care of their equipment and also to look out for the tools belonging to other craftsmen who are in the same vicinity. He should see also that the men do not abuse transportation equipment in traveling to and from their work. The enforcement of these suggestions will have a tendency to form economical habits among the men. Below are the rules:

Don't set a special time for putting the tools away for the night, but be governed by the class of work you are on, and allow ample time for the proper care of them.

In transporting your outfit by train, motor or other conveyance see that it is placed so that it will reach its destination as intended.

Make a business of being on a friendly footing with members of all departments who have anything to do with the operation of your road, for by antagonizing them you run chances of having your tools abused while in transportation.

Wood staging of all descriptions should be properly painted with paint suitable for the kind of wood it is composed of after thorough drying. Staging properly painted will outlive the unpainted, six to one. Store all kinds of staging in a cool, dry, and as near as possible, in an even temperatured place, so expansion and contraction will work as little as possible.

Ropes should never be stored while damp. In preference, let them remain outside till dry enough for storing and then either hang on round pegs in a cool, dry place or lay on a rack built so that air has free circulation around them.

Brushes of horse hair and fibre that are inclined to work flabby can be stiffened by dipping the entire stock into a fair grade of varnish and allowed to lie over night in a temperature of about 60 deg. F., and then partially cleaned in turpentine and used shortly after cleaning.

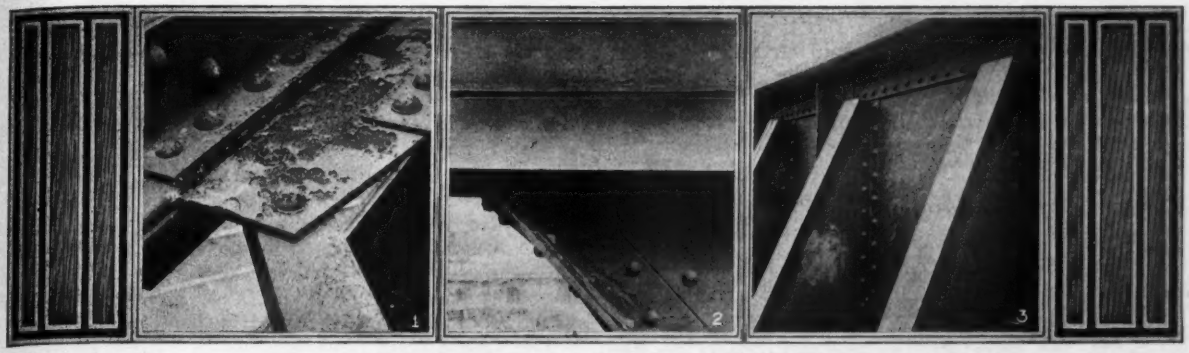
Wooden staging used on bridge work should have wood or metal protection on all parts subject to abrasion in hanging or dropping.

Tools should not be dropped or thrown to men on staging. It is better to use a container (suitable for the tools handled) tied to a light, strong hand line.

Paint pots for general work should be made from light sheet iron with crimped bottoms and riveted handles, as they will stand considerable rough usage and can easily be cleaned by burning out the paint skins.

A motor car is one of the most important tools and should be treated in a manner befitting its station. In a nutshell, use brains.

Chisels, bars or other instruments for removing hard corrosion on steel should not be kept very sharp, especially for removing the most of the rust, for you may not only weaken the structure you are cleaning by going deeper than necessary, but also chip or break your tools, causing delay and expense. Incline towards brushing the rust off and do the final cleaning by light taps with your sharp tools.



(1) *An Example of Severe Scaling.* (2) *Typical Case of Fair Condition Except for Local Pitting and Scaling.* (3) *A Well Preserved Coating.*

AN UNUSUAL EXPERIMENT ON BRIDGE PAINT

Pittsburgh & Lake Erie Made a Six-Year Test to Determine the Effect of Omitting the Shop Coat

THE PITTSBURGH & LAKE ERIE recently completed an interesting experiment in the painting of steel bridges which had been undertaken to test the relative merits of several brands of paint for given conditions of exposure and to determine the effect of dispensing with the shop painting of structural steel. This test was carried out on eight bridges at Youngstown, Ohio, and included four crossings of the Mahoning river, several railway undercrossings, two overhead highway bridges, one overhead foot bridge and two street subways or undercrossings. These bridges involved both ballasted and open floor girders of through and deck types and open floor truss spans of considerable length.

The paint used was supplied by eleven paint manufacturers, each of whom was permitted to select the paint most suitable for the conditions of exposure described by the railway officers. The manufacturers were also invited to specify methods of application which in their opinion would accomplish the best results, but after being afforded an opportunity to examine the railway company's specifications for paint workmanship, they all expressed their willingness to have their paints applied according to the methods adopted by the railroad.

The bridges were fabricated and erected during 1913 and 1914 under specifications eliminating all shop painting except on surfaces concealed in shop assembly and erection and for necessary marking. Exceptions to this occurred in three cases which were all given shop coats according to usual practice. The steel surfaces were allowed to stand exposed to the elements for a variable time before the two field coats of paint were applied.

The condition of the spans at the time that the field painting was done varied widely. Some were badly rusted and scaled, while on others considerable areas of the mill scale were still intact. In general, from 80 per cent to 95 per cent of the mill scale was well rusted and was easily removed by scrapers, wire brushes, etc., in the usual manner for cleaning surfaces. The remainder of the mill scale was removed by chipping with hammers.

It was the intention to give the bridges a third field coat in lieu of the missing shop coat after a sufficient interval to disclose any defects in the earlier coatings which were to be corrected and spot-painted before the third field coat was applied. Unfortunately, the vicissitudes of the war period prevented the execution of this feature of the plan.

The paint on these bridges was subjected to the very severe atmospheric conditions encountered in a steel manufacturing center. Crossings over other railways and over the waters of the Mahoning river, which is badly polluted with industrial wastes, introduced other severe exposures.

A study of these structures after six years of service shows such a wide variety of conditions of the painted surfaces that it is difficult to draw more than general conclusions. The officers of the railroad, however, have been enabled to learn something of the relative merits of the paint coatings used. In one place in particular there was a rather marked difference in the results secured with two brands of paint under practically identical conditions.

The condition of the paint surfaces determined from a careful inspection and graded according to carefully weighted values for the various attributes of the paint, resulted in the establishment of conditions-per-cent for the coatings of the various structures which with two exceptions varied from 66 per cent to 89 per cent, the average being 79 per cent. The two exceptions were 37 per cent and 44 per cent, and the cause of this poor showing is not at all apparent. An idea of the wide variation in the conditions may be obtained from an examination of the photographs. In general all horizontal surfaces were in a worse condition than the vertical surfaces. The most common condition where rusting has taken place is a general roughness of the surface, produced by the breaking of very smali blisters, which in general are easily removed with a wire brush.

Owing to the widely different exposure conditions, it is very difficult to reach a thoroughly satisfactory conclusion. The cost of cleaning the surfaces in the field before applying the paint was considerably greater than the cost of applying the shop coat, and the results obtained are apparently in favor of the shop coat, but it must be borne in mind that these structures have three coats as against two coats of the all-field-painted structures, and also that it was not the intention to expect the two coats to last for the six-year period.

An important point to be considered in putting this idea into use is the greater burden of responsibility placed on the field painting forces in thorough cleaning before the painting is done. Structures allowed to stand without paint protection for a considerable period are obviously covered with considerable coatings of rust and scale and unless the surfaces are thoroughly cleaned, the

result will probably not be as good as if a shop coat had been applied to the metal with its mill surface.

This study has been carried on by the engineering department of the Pittsburgh & Lake Erie. We are indebted to A. R. Raymer, chief engineer, for an opportunity to compile the information presented above.

THE ANNUAL MAINTENANCE BUDGET

BY A. BONN
Baltimore & Ohio, Baltimore, Md.

THE ADVANTAGE of working through annual maintenance budgets has never been given full consideration, and, therefore, the time and thought devoted to their preparation has been more or less limited. The maintenance officers have so often seen their budgets thrown in the discard before the year has fairly gotten under way, that they have become skeptical of the help to their work to set down beforehand what they should spend and the direction in which the expenditures could best be applied.

Frequently they are not masters of their own households, as both those above and below them believe they know better what should be done. This is apt to lead them to the conclusion that it is a case of "good luck rather than good management." They know how many times their recommendations are changed arbitrarily, and they grow into the habit of overstating the needs and think the only way to succeed is to beat the other fellow at his own game.

They finally become satisfied to work from month to month, they allow their better judgments to be overruled; they accept, without question, the decisions of their superiors, although they may be aware that it is to the disadvantage of the physical requirements of the property to do so. So long as they are not afraid of the safety of the property or the equipment, they feel as if the development of the maintenance standards has been taken out of their hands.

You can hardly say that they are discouraged, but they are certainly working under conditions which will take away the proper initiative and will leave the working out of the general program more to the sub-officials than it should be for the good of the upbuilding of the maintenance of the road.

In the past few years it is noticed how much more thought is being given to maintenance problems. Writers are suggesting strongly the closer analysis of maintenance costs; they approve of annual budgets and are in favor of raising the standing of the chief maintenance officers. They realize that the annual expenditures for maintenance are growing rapidly and must be subjected to full study and the necessary work must be planned ahead. The work must be followed up by responsible heads and the upkeep of the property must be carried on in an orderly manner.

Following the return of the roads after federal control there was a demand on all sides for something different in the management of railroading, the time is opportune to start the submission of annual maintenance budgets along lines which will command confidence in their value and will result in better and more economical maintenance. No budget can be worth much which is not based on a physical analysis of the property. By physical analysis is meant reliable and trustworthy information, setting forth the relative life of the several units of property under the different degrees of use to which they are subjected. Some roads have already started to collect information. They are studying their rail and tie conditions in such a manner that if the results of their work might be embodied in the annual budgets, these two very important units would no longer be controlled by the inexperienced judgment of the higher officer.

The executive will heed the maintenance conditions as stated in the budget if he knows the basis is sound. He will show sympathy and, to the best of his ability, he will endeavor to make the appropriations ample at all times. He will instil confidence in his maintenance officers, which will be reflected to those who are delegated to do the actual work. The new era is one of co-operation, not criticism. Large sums of money have been spent wrongfully through criticism.

The slogan from now on must be "value received." Every dollar spent, if not properly applied, will be felt. The margin of profit in railroading has reached a point where close supervision over expenditures is necessary as never before. If the work for each year is laid out at the beginning there will be some incentive to see it carried out economically. The man on the ground, when he knows that those who pass out the money are co-operating with him, will put forth more energy and try and beat his best record.

The day of basing all upon the per cent of gross revenue should pass forever. If the expenditures are made on prearranged annual schedules, the atmosphere will be cleared and the work will be done with more cheerfulness and devotion to duty, and the relation of expenditures to revenue better maintained.

Everyone will tell you that there is lost energy at the present time. It is certainly possible to restore some of it by working out a closer union among all those concerned in the maintenance of the way and equipment. The annual maintenance budget opens up a good starting point for this new day.

HOW TO STORE SACKED CEMENT

UNLESS properly stored, cement will soon absorb enough moisture from the atmosphere to affect its quality. It must be kept dry at all times prior to use; therefore, it should be stored in a damp-proof, weather-tight building. No matter what the condition of weather or season, the atmosphere always contains some moisture. The more nearly air-tight the storage building can be made and kept, so as to prevent influence of changing outdoor atmospheric conditions, the less effect will there be on the quality of the cement while in storage.

For storage in the immediate vicinity or on the site of construction work, so-called temporary structures are usually provided. These may be of light, simple construction, yet must be built to maintain a dry weather-proof interior. Build the floor a sufficient distance above the ground to protect against ground moisture. A double board floor of tongued and grooved lumber is best, with the boards of the upper floor laid at right angles to those in the lower one, and a layer of tarred or other water-proof paper between.

The walls of a wooden shed may be made damp-proof by applying one or more layers of tar paper. A one-way roof is simple and satisfactory with tongued and grooved boards, well covered with tarred roofing paper to make it leak-proof. The roof should overhang the walls at least a foot on all sides of the building and should be so firmly secured to wall studs or framing that there will be no danger of its being blown off. Windows may be dispensed with, but if thought necessary for light, should be placed well up under the roof overhang to make them more weather-tight.

When cement in sacks is stored in high piles for a considerable time, there is a tendency for that in the lower

sacks to "cake" due to pressure of the sacks above. Cement that has caked from this cause can be reconditioned by either rolling or dropping the sack on the floor. Cement to be stored for a short time only may be piled 12 or 15 sacks high, but if to be stored for a long period, piles should not be more than 7 sacks high in order to minimize caking or "warehouse set."

The cement may be piled directly on concrete floor laid on a well tamped fill of cinders or gravel, or a floor elevated above ground. Pile sacks closely but not in contact with building side walls. No more free air space should be left than necessary, however. When storing for long periods in permanent structures, pile about one foot away from the wall.

To lessen the danger of piles overturning, pile the sacks in headers and stretchers—that is, alternately lengthwise and crosswise so as to tie the piles together. However, if piles seven sacks high are laid up carefully there will be little danger of their overturning. This height of pile makes it easier to handle sacks in and out of the storage building because the hand-trucks used to move cement in the storehouse usually carry seven sacks.

The capacity of a storehouse depends upon its floor area and the height to which sacks are piled. A sack of cement occupies a little over 2 sq. ft. of floor space and about 1.25 cu. ft. of volume space. If it is necessary to store a greater amount of cement on a given floor area, the height of pile can be increased to 14 or 15 sacks high. This is usually the maximum that can be laid up economically.

The space in the storage building should be sufficient to allow proper clearance between piles and building walls, and 3 feet for trucking aisles between piles. The different shipments should be so piled as to permit removal from storage in the same rotation as received and thus avoiding excessive storage of any portion.

The most common method of handling cement is by two-wheeled hand-trucks of 7 sacks capacity. Four-wheeled trucks and wheel-barrows are sometimes used. When moving cement from warehouse piles, some sacks should be removed from two or three tiers back rather than all from one tier. If the piles are thus stepped back, particularly when they are 15 sacks high, accidents due to a pile of sacks overturning are prevented.

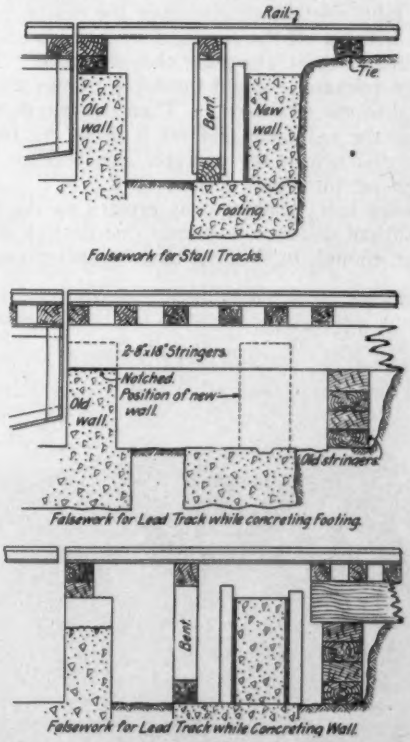
How a Turntable Was Replaced

BY CHARLES W. SHORE
Mobridge, S. D.

THE WRITER'S attention was called to the article in the February issue of the *Railway Maintenance Engineer* describing the renewal of a turntable that required services in the roundhouse to be abandoned for a period of 18 hours. As the writer assisted in a similar operation that took only 5½ hours, he believes an account of the manner of carrying out the work would be of interest: The 80-ft. turntable serving the roundhouse of the Chicago, Milwaukee & St. Paul at Marmarth, N. D., having become inadequate to handle the Mallet type locomotives properly, it became necessary to replace the table by a new one 90 ft. long. This table served 18 roundhouse stalls, four wheel tracks and three lead tracks, consequently the problem of changing out the table with a minimum interference with the operation of the roundhouse introduced a number of complications.

The first step was the construction of the new circle wall with its inside face five feet outside of that of the old wall. While this work was in progress the mechanical department released an average of three tracks at one time, although on some occasions five tracks were taken out of service. In the case of the three lead tracks it was necessary to have them ready for operation constantly. Therefore, while building the new circle wall under these tracks, it was necessary to support them on falsework. Two 8-in. by 18-in. stringers were placed under each rail and the excavation was made for a bent outside the location of the new wall so that the stringers could span from this bent to notches cut in the old wall. With the tracks supported in this manner, the excavation for the footing of the new circle wall was taken out and when the footing was completed a frame bent was set up outside of the old wall with the caps directly under the rails and the rails spiked to them. The stringers were pushed back to clear the position of the new wall so that the forms could be built and the walls concreted.

In the case of the tracks that could be taken out of service, the work was not so complicated. The general plan was to tie up about three tracks, excavate and place the footing. After this had been allowed to set for three days, a bent composed of 8-in. by 8-in. second hand ties was erected between the old wall and the position of the new wall with the rails resting directly on the caps. In most cases the ground was found sufficiently stiff to stand vertical, so that no bent was required outside the location of the new wall and usually no outside form work was required for the wall. The track was then restored to service and the circle wall concreted while the track was in use.



Manner of Supporting the Radial Tracks

When the new wall was completed the old wall was broken up by battering rams, consisting of pieces of rail slung from a pole attached to the turntable near the end. These rams broke the wall into sections about four feet long, which were disposed of in trenches excavated in the turntable pit just inside the old footing. The smaller pieces and debris from the wall were loaded on a car for use as riprap. After the change in the table had been completed, the larger blocks were lifted out of the pit with a derrick car.

As the old wall was taken out, bents of second hand ties were erected in its place to support the ends of the track rails. The new circle timbers were placed on top of the new wall at odd times in the course of the work and by the time that this work was completed the new turntable was delivered and the steel bridge gang and equipment for erecting the table arrived.

When the day was set for changing the tables, the roundhouse foreman was instructed to arrange his work so that he would not need the turntable for a period of eight hours, beginning at 1 p. m. As fast as the roundhouse stalls were vacated the rails were cut off to fit the new circle wall and the frame bents were removed. For the four or five tracks that were to remain in use until the last minute, rails cut to the right length were provided so that the short sections could be lifted out quickly. Ties and rails for the new table were also made ready in addition to two extra rails.

When the table was finally released at 1:30 p. m., the first procedure was to run the cars carrying the new turntable across the old one, with a derrick car at each end, this arrangement being made possible because one stall track lined exactly with one of the lead tracks. With the new table spotted exactly over the old one, the derrick cars lifted it off the cars and set it down on blocking in the turntable pit alongside the old table. The cars were then released, the old turntable tractor was picked up and taken out of the way. Then the two derrick cars picked up the old table and set it down on blocking a sufficient distance to the opposite side to clear the new one when set into final position.

Following this, cribbing was erected in the turntable pit a sufficient distance to permit one derrick car to advance far enough to pick up the old center casting and remove it. Then followed a detail of the operation which occupied a part of the time that could ill be spared, but unfortunately it was a portion of the work that was very important to carry out correctly. The old center pier was ¾ in. too high and not exactly level. Consequently, it was necessary to dress down the concrete for an average of ¾ in. before the new turntable could be set in place. In addition it was necessary to drill four anchor bolt holes. To carry on this work bush hammers, sledges, chisels and hand levels were assembled and as soon as the center was removed as large a portion of the force as possible was used in cutting down the old concrete. Pneumatic tools were not available, so it was necessary to do all this work by hand and the men were used in shifts so as to make the quickest time. This work occupied about 1½ hours. While this work was in progress ties were placed on the new table and the circle rail was bolted up. When the center pier was ready a derrick brought out the new center casting and set it in place and then backed away, picking up the cribbing.

When this step had been completed the two derricks picked up the new table and skidded it over into place on the new center, where it was let down by hydraulic jacks. After the girder had been lined and the work on the circle rail completed, the flat cars were brought back with the derrick cars and the old table was picked up, loaded on the cars and hauled away. While this was being done the new table was swung to check up the grade and alinement of the circle rail, the table being turned temporarily by hand. This completed the work for the day and the table was turned over to the mechanical department 5½ hours after the last locomotive had passed over the old table. On the following day the finishing touches were put on the work. These consisted of sizing and spacing the circle rail ties, cleaning up the pit, etc. The removal of the concrete blocks and deepening of the turntable pit to obtain more clearance for the new table were not carried out until some time later.

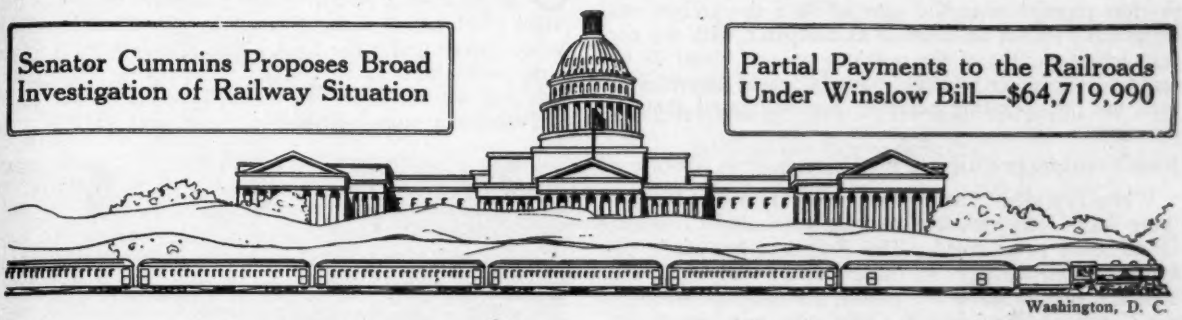
The organization engaged in the work of changing the turntables consisted of three crews of about eight men each, six section men to handle the rail changes, one train and engine crew to do the switching, one general foreman, and one instrumentman.

One of the New Express Cars Now in Use on the New York Central. The Removable Containers Are Lifted on and off by a Crane

RAILWAY AFFAIRS AT THE NATION'S CAPITAL

Senator Cummins Proposes Broad Investigation of Railway Situation

Partial Payments to the Railroads Under Winslow Bill—$64,719,990



Washington, D. C.

A GENERAL INVESTIGATION of the railroad situation is about to be undertaken by the Senate Committee on Interstate Commerce. This will involve particular reference to the large increase in operating expenses and the question as to what should be done to carry out the purpose of the transportation act to give the railroads a six per cent return on their value. Senator Cummins, chairman of the committee and the principal author of the Transportation Act, has announced his intention of presenting a resolution authorizing the investigation at the opening of the extra session of Congress on April 11. He has so little doubt of the Senate's action on the subject that he has already made preparations for hearings which will cover a wide range of ground. The senator was inspired to call for such an investigation by the fact that the operating expenses for 1920 were about $1,400,000,000 greater than they were in 1919, in spite of the expectation which was so commonly held that the railroads under private management would be more economical than the Railroad Administration, and that about half of the railroads, instead of earning 6 per cent, were accumulating steadily increasing deficits. The senator appears to have been somewhat startled by such a condition, but after some preliminary investigation of his own he has gained a better understanding of the situation, which he desires to share with his colleagues and the public. For example, he has learned that a much more important factor in the situation than the falling off of traffic is the increase in operating expenses, which resulted directly from the federal administration of the railroads, but which had a much greater effect on the figures for 1920 than they did in 1919. The hearings are likely therefore to result in more or less of an investigation of what took place during federal control, as well as of what has happened since, but Senator Cummins proposes a thorough airing of the whole situation. It is apparent that one of the ideas he has in mind is to head off the efforts that have gained impetus in some quarters to try to correct the situation by further legislation by way of tinkering with the Transportation Act.

"Present operating expenses are too high," declares Senator Cummins, "and both Congress and the public are interested in knowing the reason. Giving all the weight which can be given to the diminished traffic, it will not account for the negligible net income which the year will show. Neither will it suffice to say that critical comparison of the railway performance for the year just closing, with the railway performance under federal control, is exceedingly favorable to private management. That comparison, however satisfactory to those who believe in private ownership under public control, does not solve the problem.

"Obviously the conclusion to be deduced is that it is costing the railroads too much to earn the money which they are earning. This may be due, of course, to mismanagement, or to inefficiency, or it may be due to the excessive cost of material and supplies, or to unreasonable compensation paid to those, from president down, whose labor operates these roads.

"If the railroads are to survive and render the service which the people of the country must have, the question I have proposed must be answered. It must be answered speedily, wisely and justly. It will be found, I think, that the answer does not lie in the main with additional legislation, but in the prompt and fair administration of existing law. However that may be, the people have a right to know all the facts, and make up their own minds after an intelligent consideration of the entire subject. To that end the investigation I have suggested ought to be made, and so far as I can influence the matter it will be made."

Traffic Begins to Pick Up

While freight traffic and consequently railroad earnings have been steadily falling off since the latter part of October, and February showed the lowest volume of freight traffic for that month in several years, a slight improvement became noticeable during the first two weeks of March. The number of cars loaded with revenue freight showed an increase during the week of March 5 almost for the first time since last fall, and, while the following week did not maintain the gain, the loading was greater than for any other week since January. The carloading for the week of March 12 was 702,068, as compared with 819,329 in 1920 and 701,266 in 1919. The loading of merchandise and miscellaneous freight, which is over 400,000 cars a week, has shown considerable improvement, but the coal loading, except anthracite, has been steadily decreasing.

There was a surplus of 424,409 cars during the week of March 15, of which over half were coal cars. This was the largest surplus recorded since the depression of the early part of 1919, but the box car surplus has been decreasing. A very large part of the cars reported as surplus, however, are in bad order, because the railroads have had to make such drastic reductions in their car repair forces. On March 1 over 10 per cent of the freight cars were in bad order.

Net Earnings Reduced

The net operating income of the roads, which has been steadily decreasing since October, had practically disappeared during January, although the gross earnings, both freight and passenger, have been larger each month since the rate advance than they ever were before for the corresponding months. For the last four months of the year the roads earned at the rate of 3.3 per cent. In

December they earned only $10,000,000, or less than 1 per cent, and for January preliminary returns for 182 roads show a net operating income of only $142,000. For the five months since the rate advance the freight revenues have shown an increase as compared with the corresponding months of the previous year of about 27 per cent and passenger revenues have increased about 15 per cent, but the operating expenses have increased about 29 per cent.

NEW INTERSTATE COMMERCE COMMISSIONERS APPOINTED

When President Harding was inaugurated on March 4 there were four vacancies on the Interstate Commerce Commission to be filled. The President has made two appointments, leaving two more places to be filled. His appointment of Mark W. Potter, formerly president of the Carolina, Clinchfield & Ohio, who has served as a member of the commission for several months under a recess appointment by President Wilson, was immediately confirmed by the Senate, but that of John J. Esch, who has been chairman of the House committee on interstate and foreign commerce, was postponed until the extra session because of the delay caused by the objection of Senator La Follette. Mr. Esch was then given a recess appointment so that he could begin serving upon the commission pending his confirmation.

The President has also to appoint a new director general of railroads in charge of the liquidation of the affairs of the Railroad Administration, to succeed John Barton Payne, who resigned shortly after his retirement as secretary of the interior. There are also three appointments to make as members of the Railroad Labor Board, because one member of each of the three groups in the board was originally appointed only for one year. The members whose terms expire in April are W. L. Park, of the railroad group, Henry T. Hunt, of the public group, and J. J. Forrester, of the labor group.

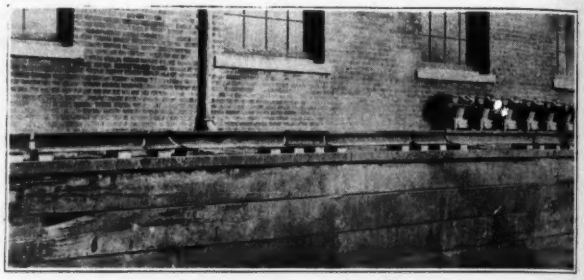
PARTIAL PAYMENTS BEING MADE ON RAILROAD GUARANTY

After the passage of the Winslow bill the Interstate Commerce Commission began very promptly to issue certificates for partial payments to the railroads on account of their guaranty for the six months' period following the period of federal control and by March 22 certificates had been issued and paid to the amount of $64,719,990 to 29 roads. The largest certificate was for $12,000,000 to the Chicago & Northwestern, but a number have been issued for $6,000,000 or $7,000,000 as well as for smaller amounts. Below is a partial list of payments made to the railroads up to March 22:

Great Northern	$6,000,000
Chicago, Milwaukee & St. Paul	3,137,190
Northern Pacific	7,000,000
Chicago, Burlington & Quincy	7,000,000
Illinois Central	2,376,000
Chicago & Alton	800,000
Minneapolis & St. Louis	500,000
Tennessee Central	115,000
Chicago Great Western	1,335,000
Texas & Pacific	1,000,000
Ulster & Delaware	219,800
Gulf, Mobile & Northern	200,000
Philadelphia & Reading	2,000,000
Raritan River	60,000
Chicago & Northwestern	12,000,000
Chicago, Rock Island & Pacific	6,000,000
Chicago, Indianapolis & Louisville	400,000
Boston & Maine	6,500,000
Baltimore & Ohio	6,400,000
Delaware, Lackawanna & Western	2,000,000
Alabama, Tennessee & Northern	40,000
Atchison, Topeka & Santa Fe	5,425,000
Central New York Southern	27,000
Gulf, Colorado & Santa Fe	1,575,000
Maine Central	300,000

AN INTERESTING RAIL FAIURE

ON JANUARY 5 a unique rail failure occurred when an El Paso & Southwestern passenger train was derailed (fortunately without casualties) by a rail breaking in ten pieces under the load. The rail with the broken parts assembled is shown in the accompanying illustration. This rail was an 85-lb., A. R. A. Type-A, section made of Bethlehem open hearth steel from heat 15179 C. It



Broken Rail Assembled

was rolled in April, 1909, and laid the same year. An examination of the broken sections revealed the fact that each section showed a well defined transverse fissure in the head of the gage side of the rail, the fissure as illustrated being typical of the section at all the nine breaks. This condition undoubtedly accounts for the similarity in the nine fractures of the rail and to a certain extent for the regularity in the intervals between breaks, it appearing that fracturing occurred just at each side of the

Typical Section of Broken Rail

ties while the wheel load was concentrated between ties. As in a continuous beam the head of the rail under such a condition would be under high tension and the whole section subjected to a maximum force, with the consequence in this case that the weakened head was split open.

DAYLIGHT SAVING—On March 27 Chicago moved its clocks ahead one hour. Like action will be taken in New York on April 24.

WELDING RAIL BONDS BY OXY-ACETYLENE

A Discussion of the Adaptability of This Method With Directions for Its Use and Information on Serviceability

BY A. S. KINSEY,
Advisory Service Engineer, Air Reduction Sales Company, New York

THE APPLICATION of oxy-acetylene welding in maintenance of way work is receiving such general attention that a further recent extension of its use to the bonding of rails for electric track circuits for signals and other purposes is of interest. While maintenance of way employees are not commonly charged with the responsibility for the care of these track circuits, they are thrown in close contact with this work at all times. Track forces particularly must adopt precautions to prevent the breaking of bonds when working around rail joints, while in some cases they are required to maintain these bonds. They are therefore interested in the development of gas welding for this purpose, particularly as this equipment has already been largely used in other routine operations of track maintenance, including the building up of frogs and switches.

PRINCIPLES OF OXY-ACETYLENE WELDING AND ITS EFFECT ON STEEL RAIL

Oxy-acetylene welding is not brazing, soldering or the sticking of one plastic metallic surface to another, but it is the actual melting of two adjacent metals and flowing them so that their grains thoroughly intermingle and become as one mass. This may be done so successfully as to produce a weld of nearly one hundred per cent tensile strength and at the same time retain most of the valuable ductility, or bending quality, of the original metal.

There is a good metallurgical explanation of this. An oxy-acetylene torch obtains its heat from the burning of a combination of pure oxygen and a gas very rich in carbon called acetylene. The flame gives a temperature of about 6,300 deg. F. Steel melts at about 2,500 deg. F.; therefore, it will be readily understood what a powerful heating medium the oxy-acetylene torch is and how conveniently it may be applied in a multitude of ways.

The oxy-acetylene flame has at its center a small white cone at the point of which is to be found the highest temperature. To operate the torch properly the flame should be pressed down on the work until the cone nearly touches the metal to be melted. This allows the main part of the flame, called the *envelope*, to spread itself over the hot metal and thereby prevent the outside air from reaching and oxidizing it. Therefore, with the outside air excluded and the atmosphere inside the flame of a neutral non-oxidizing character, it is quite possible to produce a highly successful weld with the oxy-acetylene torch.

Now, in the welding of a bond to a steel rail the following conditions are to be met: If the ordinary signal bond with wrought iron terminals is used, the torch must first be able to weld the copper filler to the wrought iron (which has a carbon content of about .01 per cent) and the copper end of the terminal, and at the same time weld the filler metal to the ball of the steel rail which contains about .90 per cent carbon. This is welding a non-ferrous metal to a low carbon iron and to a high carbon steel which would be a very difficult undertaking if it were not for the neutral non-oxidizing nature of the oxy-acetylene flame. The principal risk, of course, is that the high carbon content of the rail may be reduced by the absorption and consumption of the carbon by the flame of the torch and thereby soften and weaken the rail; because of the chemical nature of the flame this does not happen, and it is quite possible to prevent any liability of its occurrence by adjusting the welding torch so that its flame burns with a slight excess of acetylene. This means that the flame has enough carbon from the aceylene, and a little to spare, to maintain complete combustion, so that it cannot absorb or oxidize the carbon in the steel of the rail. The practical proof of this is that no rail trouble is being experienced by the users of the oxy-acetylene welded rail bond, and careful laboratory tests show no detrimental effect to the rail.

ADAPTABILITY OF OXY-ACETYLENE WELDING

The portability of the equipment for welding bonds with the oxy-acetylene torch is worthy of attention. The outfit consists of a light welding torch, a cylinder of oxygen and a cylinder of acetylene. These may easily be moved by one man along the line on a hand car or speeder, or a welder and his helper can carry the outfit on a small carryall. These outfits are comparatively inexpensive.

The workman need not be a skilled mechanic to get satisfactory results from the torch when welding on the bonds. The oxy-acetylene torch will operate successfully regardless of weather conditions. The gases will flow satisfactorily at the coldest atmospheric temperatures, and the summer sun will not cause inconvenience in this regard. The welding torch is substantially constructed, will withstand severe service, and its tips, made to work in gases of the highest temperatures, may be replaced at nominal cost if necessary.

The apparatus does not get out of order easily, and even if there should be an accidental disarrangement of the parts the repairs can be made at the job. The welding may be done without interference with traffic in any way and no drilling or special preparation of the rail required.

METHODS OF BONDING

A number of methods have been used to fasten rail bonds in place, the important ones being:

1. Channel-pin bonding, in which the bond wire is secured in place by passing it through a grooved metal plug (channel pin) driven into a hole in the rail. This method is used almost universally in automatic signal territory.
2. Soldered bonding, in which the copper bond is fastened in place by soft-soldering it to the ball, the web or the base of the rail.
3. Compressed or pin-terminal bonding, in which the

bond is held in place by its terminal being compressed in the web or base of the rail or by the terminal being expanded into a hole in the rail by a steel pin forced in the hole of the terminal.

4. Brazed bonding, in which the bond terminal is secured to the rail by using a hard-solder like brass.

5. Welded bonding, in which the terminal is fused to the rail by a high temperature flame.

DIRECTIONS FOR WELDING RAIL BONDS

1. The equipment should consist of a cylinder of oxygen, a cylinder of aceylene, pressure regulators and gages for the two cylinders, a welding torch with proper size tip, some filler metal, and a carryall, or hand car or speeder for the cylinders, depending on the traffic conditions.

2. Any scale or dirt on the rail should be scraped off with an old file. This is less expensive than burning it off with the torch.

3. Connect the regulators to each cylinder and couple the hose to these regulators and the welding torch.

4. Adjust the oxygen regulator so that its gage reads about 5 lb. and the acetylene regulator so that its gage is at 7 lb.

5. Open the acetylene torch valve a little and light the flame, using a spark lighter. Then open the oxygen valve of the torch until the small incandescent center cone of the flame is formed in true outline, thus giving a neutral flame. An excess of oxygen will produce an oxidizing flame, and too much acetylene will give a carbonizing flame.

6. Use an ordinary iron C clamp to fasten the bond to the ball of the rail, placing it so that the lower edge of each terminal is flush with the bottom edge of the ball of the rail.

7. Heat the vertical surface above the bond terminal to a bright red and melt over it a thin coating of the filler metal. This is called tinning. Hold the heat in the rail as the tinning proceeds. Now melt the top surface of the bond terminal and the tinied surface of the rail, and flow the copper filler metal so that it welds to the terminal and the rail. The weld should be formed on a bevel. If there is any unusual risk of the bond being struck and broken off, the filler metal should be welded to a bevel on each side.

8. The welder should also test his work occasionally by striking the top of the welded bond with a hammer hard enough to knock the bond from the rail. If it detaches easily, leaving the surface of the rail smooth, it is a poor weld. If the welding filler metal tears loose, leaving jagged surfaces of fine grains, the work is satisfactory.

9. Some bond welding crews are composed of a welder and a helper, and they should be able to weld about 12 signal bonds per hour. The most economical team, however, consists of two welders and one helper, who should weld about 25 bonds per hour. It takes about 3 minutes per bond to do the actual welding.

DURABILITY OF THE OXY-ACETYLENE WELDED BOND

The gas-welded bond is fused to the ball of the rail by the introduction of a special copper welding rod. The surface on the side of the steel rail ball is brought carefully to the molten condition by the torch, and the copper rod is fused to this surface and that of the bond terminal. The three parts become as one, which makes the most durable and efficient joint possible. Its strength is limited only by the shearing strength of the copper. There is no space between the bond and the rail to become filled with dirt and rust to destroy the electrical conductivity.

A gas-welded bond is fastened so securely to the rail that no further attention need be given it probably for years. On the other hand, if it is necessary to break the connection in order to remove the rail the bond may be cut off and rewelded without injury to it. The bond will be fastened quite strongly enough for most purposes by following the standard practice of welding only the top of the bond terminal to the ball of the rail, but if special conditions require a stronger fastening it may be obtained by beveling the two sides of the weld. This is sometimes done in street railway work.

TITANIUM TREATED RAILS SHOW SUPERIOR SERVICE

THE TITANIUM Alloy Manufacturing Company has just made puplic the results of an extended series of investigations inaugurated in 1913 to determine the effects of the use of Titanium in rail steel. Earlier results of these investigations were published in a series of eight bulletins, the last of which was issued in 1915. Data from the more extended tests since that date are incorporated in Bulletin No. 9, which has just been issued. The later investigations were undertaken to determine (1) the exact structural and physical differences between titanium-treated and untreated rails and the causes for differences in service; (2) a simple, practical method for ascertaining the efficiency of the titanium-treatment so that improperly treated heats might be identified and separated from those free from excessive segregation; (3) the service which several thousand tons of titanium-treated rails have rendered in their four to six years in track as compared with rails rolled under similar conditions, but without this treatment.

During 1913 and 1914 samples of A-rails (the top rail of the ingot) from 111 different heats of standard and 101 heats of titanium-treated open-hearth steel, made for various railroads at mills of six different steel companies, were forwarded to the laboratories of the Titanium Alloy Manufacturing Company for analysis. Early in 1915 the Pennsylvania Railroad adopted its 100-lb. P. S. section rail which included a limitation as to segregation. In an earlier report it was shown that the application of this segregation specification to each of the A-rail samples from the 212 heats above referred to indicated that the A-rails from only 37 per cent of the heats of standard open-hearth steel passed the Pennsylvania requirements, whereas these rails from 93 per cent of the titanium-treated heats passed the specification.

The determination, in steel, of titanium insoluble in hydro-chloride acid is simple and can be made quickly and accurately. This determination will ordinarily make further analytical work unnecessary because so high a percentage of titanium-treated rail steel will meet the required specification for segregation. It has been suggested that, in order to conform to regular mill practice, all rails that pass the usual physical requirements be accepted by the purchaser. Samples for titanium determination could be taken by inspectors for the purchaser and sent to its laboratories or those of any agency it might employ. The results of the analytical work would be available before deliveries of rail were made and the A-rails from any heats that showed more than allowable segregation could be placed where track service was not severe. Arrangements might be made with the rail mills that such rails would be classed as seconds or specials.

It is claimed by the manufacturers that the adoption of this simplified method should (1) eliminate the majority of rail failures; (2) assure the purchasers of rails of the more uniform steel throughout all the ingots of a heat; (3) provide a larger yield of acceptable rails by eliminating serious segregation in the upper portion of the

ingot and (4) offering the possibility of raising the carbon content of the steel slightly since the segregation can be controlled effectively. This would result in better wearing steel.

In substantiation of its claim that these results have been obtained, attention is called to the comparative test of 14,310 tons of standard 90-lb. A. R. A. type A open-hearth rails rolled at four different mills and 6,000 tons of titanium-treated open-hearth rails of the same weight and section laid in tracks of the Chicago & Alton in 1913. These tonnages were laid so that the service for all rails was approximately the same. In this investigation of nearly eight years the total failures of standard open-hearth rails has been 116 and of titanium-treated rails 16, or 114.56 and 37.72 per 100 track miles, respectively.

Similar analyses of the rail failure statistics of the American Railway Engineering Association for 1918 showed average failures per year in service per 100 miles of track to be 13.7 for standard open-hearth rails as compared with 6.8 for titanium-treated open-hearth rails, while similar figures contained in the report for 1919 show 14.6 and 4.9 failures, respectively.

Attention is also called to a report of the A. R. E. A. Rail committee in May, 1917, which included inspection results on approximately 195,000 tons of 100-lb. P. S. section open-hearth rails made for the Pennsylvania Railroad under its 1915 special segregation specification, in which the average discard from the top of the ingot was 26.2 per cent and the average rejections 9.0 per cent, giving a total average discard and rejection of 35.2 per cent. In comparison, inspection records on the manufacture of 13,000 tons of titanium-treated open-hearth rails rolled in 1913, 1914 and 1919, showed an average discard from the top of the ingot of 9.0 per cent and a rejection of 3.8 per cent. Applying the Pennsylvania segregation specification to this tonnage the total discard and rejection would have been 15.67 per cent, or less than one-half that of the Pennsylvania Railroad rails.

A Modern Electric Pumping Station

By C. R. Knowles,
Superintendent Water Service, Illinois Central, Chicago

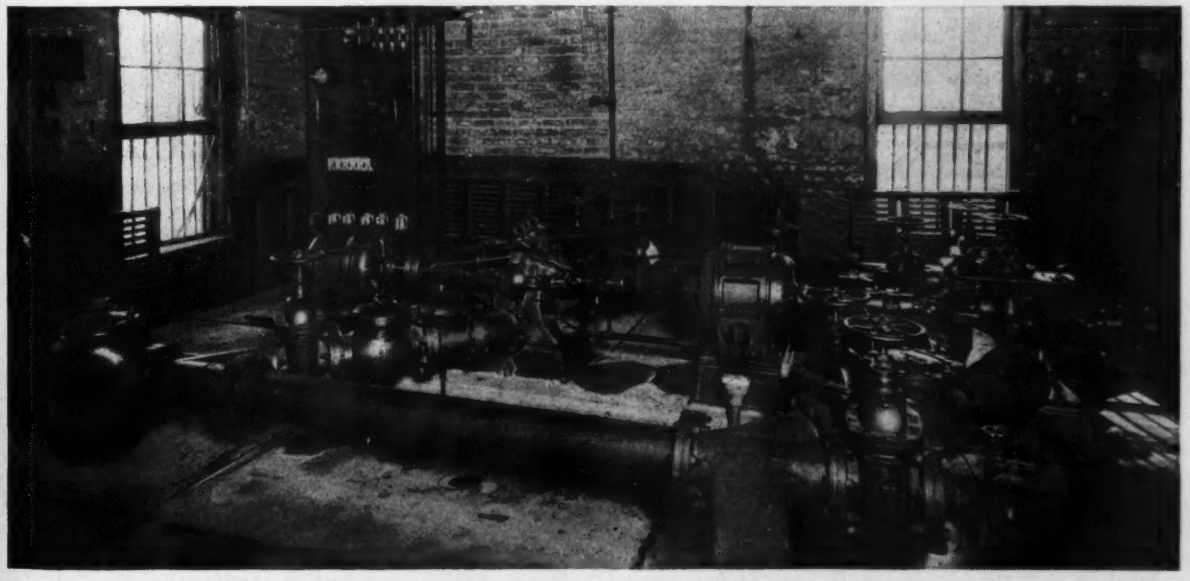
THE ILLINOIS CENTRAL pumping plant at Kankakee, Ill., was recently equipped with electrically-driven pumps, replacing steam pumps and boilers which had become inadequate to supply the increased demand for water. The electrical installation consists of duplicate units, each having a capacity of 30,000 gal. per hour against a head of 130 ft. The pumps are automatic in operation, being controlled by the height of water in the tanks. The former steam plant required the services of three attendants, while only one is employed in the operation of the electric plant.

The pumps are single-stage, double-suction, horizontal, split-shell, centrifugal pumps with 5-in. suction and discharge. They are bronze fitted throughout with bronze enclosed impellers. The pumps are designed to deliver 500 gal. per min. against a total head of 130 ft., including 15 ft. of suction lift. The motors are 25-hp. horizontal, 3-phase, 60-cycle, 220-volt, 1,750 r.p.m. cross-the-line type, self-starting motors. The motors and pumps are direct connected and mounted on the same sub-base. The control panel is of the Sundh type, consisting of the following equipment:

Two overload time limit relays of the hand reset type.
Main line switch.
Phase protective relay.
Two-pole knife switches for hand operation.
Three-pole, double-throw knife switch so wired that either motor may be operated singly but not together.
Double-pole, cross-the-line contractor for throwing the motor across the line, and a gage type pressure regulator for operating the panel by tank pressure.

The pumps are fitted with a diaphragm by-pass valve to the suction for automatic priming when operating under float control.

The station was placed in service in January, 1920, and during the subsequent calendar year 109,368,000 gal. of water was pumped at a cost of $2,154.35 for elec-

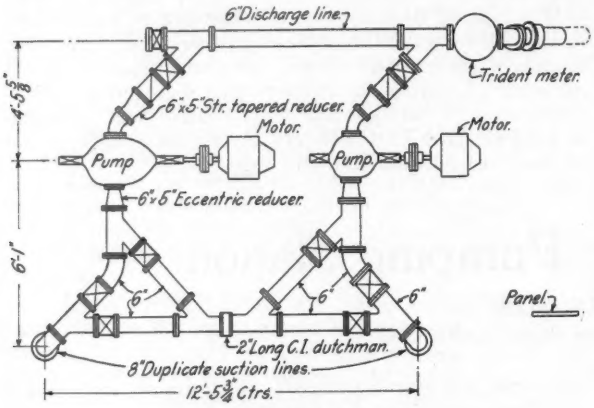


Interior of the Pump House, All the Piping Exposed

tricity, or an average cost of $0.0196 per thousand gallons for power only, the current consumption being 66,390 kw. h., at an average cost of $0.0324 per kw. h., the pumping head ranging from 100 to 110 ft.

The cost for current about equals the cost of coal formerly used in the operation of the steam plant, the net saving being equal to the salary of the two men whose services are dispensed with, and which amounts to approximately $2,000 per year.

The operating results for 1920 by months are given in Table 1. The results given are taken from the current



The Pipe Layout

consumption as shown by electric meter on the switchboard and water pumped is measured by a current type of meter located in the discharge line.

TABLE 1—STATEMENT OF OPERATING RESULTS FOR 1920

Month	Current Consumed	Cost of Current	Water Pumped
January	5,370 kw. h.	$ 174.57	8,950,000
February	5,820 "	168.98	9,775,000
March	5,650 "	165.92	9,450,000
April	5,440 "	162.14	9,190,000
May	4,940 "	152.59	8,105,000
June	4,870 "	151.12	7,955,000
July	5,430 "	161.96	9,018,000
August	4,530 "	184.79	7,405,000
September	5,820 "	201.71	9,690,000
October	5,840 "	202.19	9,720,000
November	6,100 "	208.43	10,015,000
December	6,580 "	219.95	10,095,000
	66,390 kw. h.	$2,154.35	109,368,000

The operation of the pumps has also been checked up at various times, the result of a recent test under varying heads and deliveries being shown in Table 2:

TABLE 2—PUMPING RECORD

Time	Pressure	Suction, inches	R.P.M. pump	Kw. Input to motor	Water pumped, g.p.m.
1:25	44.7	16.5	1,790		
1:30	44.7	....	1,790		
1:35	44.7	....	....		
1:40	44.7	16.5	....		
1:45	44.7	....	....		
1:50	44.8	16.5	....	22.8	592
1:55	....	....	1,765		
2:00	....	....	....		
2:05	45.2	....	....		
2:10	....	....	1,745		
2:15	45.3	....	....		
2:50	45.8	15.5	1,765	20.3	520
3:00	46.0	....	....		
3:05	43.8	16.5	....	23.4	650
3:10					
3:35	39.3	20.25	....	26.3	800

Note—To all total heads add 3 ft. for elevation from center of line gage to point of attachment of mercury column.

While running the test given above from 1:25 to 2:15 p. m. the water was pumped into the main or controlling tank, the line across the bridge and all other outlets from the controlling tank being closed. From this test it will be noted that the pump was delivering 592 g.p.m. against a total head of 124 ft., using 22.8 kw. This test shows an overall efficiency of 60 per cent from input through the control board motor and the pump.

The test from 2:50 to 3:00 p. m. was made in the same manner as in regular service, the water meter showing a delivery of 520 g.p.m. against a total head of 126 ft.; the input through the meter being 20.4 kw., or an overall efficiency of 60 per cent. The test from 3:05 to 3:10 p. m. showed a delivery of 650 g.p.m. against a total head of 122 ft., using 23.4 kw., or an overall efficiency of 62 per cent.

The last test shown above was with all valves wide open; the suction lift was 20.25 in. of mercury, the total head 116 ft. and the quantity of water handled about 800 g.p.m., with 26.4 kw. input, making an overall efficiency of 66 per cent. The difference appears unusually large, but it is often the case with these small pumps that there is a marked increase in efficiency when a greatly increased quantity of water is handled.

No changes were made in the existing pipe lines outside of the pump house by reason of the installation of the electrical equipment, but the piping within the building was completely changed and pumps connected as shown on piping plan. Duplicate suction lines pass from the pump house to the river and the pumps are so connected that either pump can use either or both suction lines. It will be noted that the suction and discharge lines are increased in size immediately upon leaving the pumps and that there are only two 90-deg. bends in the pump house, thereby reducing the friction loss to a minimum.

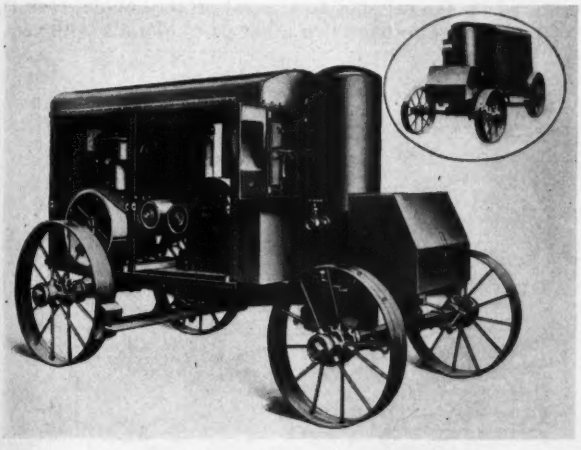
The installation has been entirely satisfactory in every respect and has given no trouble except for brief interruptions to service on account of low voltage. The conditions at Kankakee are very favorable for an electric installation, as a steam-driven generating plant and a hydro-electric plant are available in case of emergency in addition to the regular cross-country power lines.

Palms, Lawns and Spanish Architecture Lend Pleasing Appearance to the San Antonio Station of the M. K. & T.

NEW DEVICES

A PORTABLE ELECTRIC COMPRESSOR

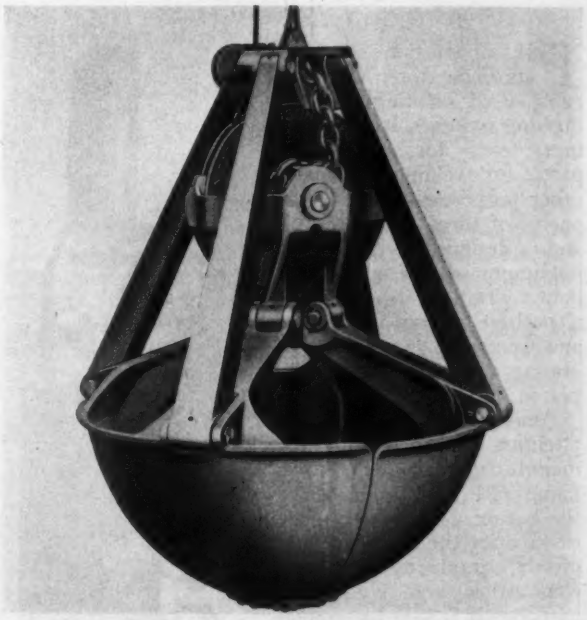
FOR USE in those places where electric current is readily available, the Ingersoll-Rand Company, New York, has developed an electric motor-driven "Imperial" air compressor. This unit is of 118 cu. ft. capacity and weighs approximately 4,450 lb., depending upon the weight of the motor. As in the case of the corresponding gasoline motor-driven compressor manufactured by this company, this electric unit is an all-steel outfit. A suitable intake unloader is provided, assuring efficient regulation. Either an alternating or a direct current motor can be furnished. In either case the motor control is in accordance with standard practice and specifications covering the type of motor used. The equipment includes an air receiver, safety valve, drain valves, pressure gage and service valves to which air hose lines may be connected. A light steel case fitted with doors completely houses the entire unit, protecting it from the weather. The doors are easily removed to allow free access to all parts.



Two Views of the Electric Compressor

A NEW ORANGE PEEL GRAB BUCKET

AN ORANGE PEEL grab bucket of interesting design has recently been put out by the Mead-Morrison Manufacturing Company, East Boston, Mass. The bucket is very strongly built, each of the four segments being cast integral with the hinge as shown, while the flange of the closing arms or hinges is carried on down the inner face of each segment. The links are also of cast steel with a channel section tapered to give maximum strength and a wide bearing surface where the links fasten to the segments. The chain forming the closing sling winds upon a cast steel winding drum so arranged that the chain does not wind upon itself, while an equalized effort is obtained on both sides by means of a saddle at the head of the bucket through which the chain is free to run. The points of the segments are of manganese steel and are removable. The bucket has a capacity of 13 cu. ft.



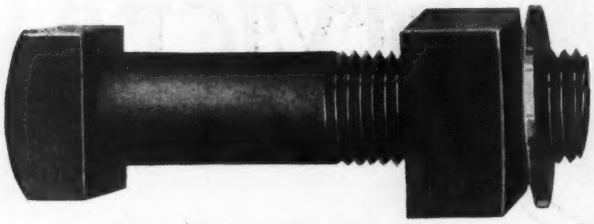
The Bucket in the Closed Position

THE DUKE NUT LOCK

THE DUKE NUT LOCK is a recent addition to the collection of devices now in existence for the purpose of preventing the nuts of bolts from becoming loose and falling off. It consists of a cupped washer, the hole in which has been expanded in maufacture. To lock a nut by means of this device the nut is first tightened on the bolt, after which the washer is applied, with the cup facing outward and flattened against the nut, the flattening causing the hole to contract.

For flattening washers on the larger sized bolts a special sledge is made having a hole bored in one end, the process of flattening, in this case, consisting of fitting the sledge

over the bolt and striking it with another hammer. Smaller sized work may be handled in a similar manner by using a hollow punch. In the lack of such tools, however, the locking may be accomplished simply by screwing a second nut on the bolt, and removing it after the flattening process has been effected.



Bolt With Duke Nut Lock Applied

It is reported that nut locks of this kind applied to several crossings on the Minneapolis, St. Paul & Sault Ste. Marie in April and May, 1920, gave no indication of having loosened their grip when last inspected in February, 1921. The scale of this nut lock is in the hands of Geo. E. Gibson, Chicago.

A NEW TORCH

THE illustration shows a kerosene torch that is being used on railroads for thawing switches, frogs, crossings, etc., for pre-heating parts, for welding and many other purposes. It has a capacity of three gallons of oil and is designed to consume a maximum of one gallon per hour. The accessories include a positive acting feed valve and a pressure gage. The operating air pressure is 25 lb. per sq. in.

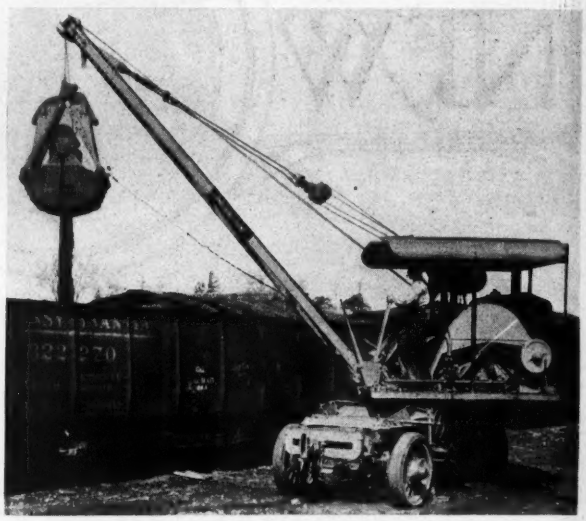
Among features to which attention is directed by the manufacturers is the long flame (24 in.) produced by the burner. This is designed to vaporize the kerosene completely, producing complete combustion and eliminating carbon. It is said to produce a temperature of 3,000 deg. F. Another advantage is that the burner will operate in any position. This burner is manufactured by the American Vapor Torch Company, Chicago.

The Torch Complete

LIGHT PORTABLE CRANES FOR VARIOUS USES

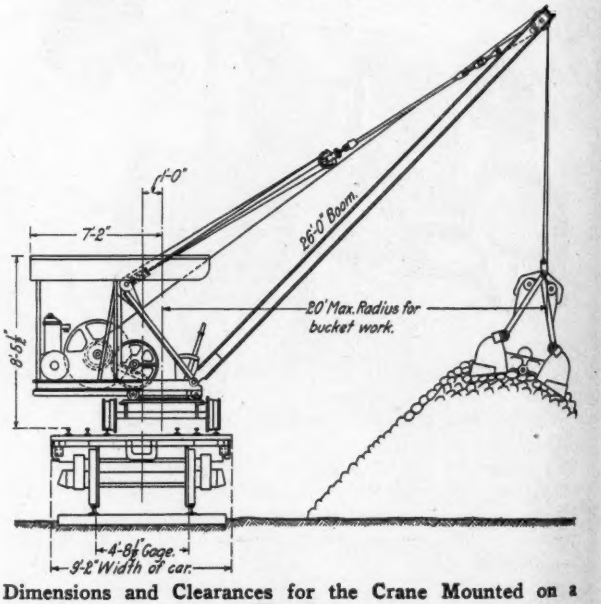
A SMALL crane that may be utilized in a variety of operations incident to maintenance of way work has been brought out by the Universal Crane Company, Cleveland, Ohio. In a measure, the general adaptability of this equipment arises from the fact that it may be used on several forms of mountings, such as a steel wheel industrial truck, a trailer, a flat car and a motor truck.

The power is supplied by a 40-hp. gasoline engine or by an electric motor of similar capacity, in which case the crane is connected by a cable with a nearby power line. The gas engine is a heavy duty, four-cycle, slow speed engine. The crane has a capacity of three or four tons and is designed to handle either a hoist block and hook, a clam shell bucket or an electric lifting magnet. Booms may be had in various lengths, up to 28 ft., the standard capacity rating with the 20 ft. boom being three tons at a 12 ft. radius and 1¾ tons at a 20 ft. radius.



The Crane on a Trailer Truck in Unloading Service

Of particular interest in railroad work is the use of this crane when mounted on a flat car. For use in this manner it is equipped with a truck with wheels on five-foot gage to run on rails laid on the flat car. For use on single track, a single pair of rails would be provided and centered on the car, but for operation on double-track it is of advantage to have two other pairs of rails with center lines one foot each side of the center line of the car. Then by mounting the crane on one of these offset tracks it is possible to operate this crane on one track of a double-track line without interference with operation on the other track, for, as shown in the drawing, the rear of the crane extends only 6 ft. 2 in. from the center line of track.



Dimensions and Clearances for the Crane Mounted on a Flat Car

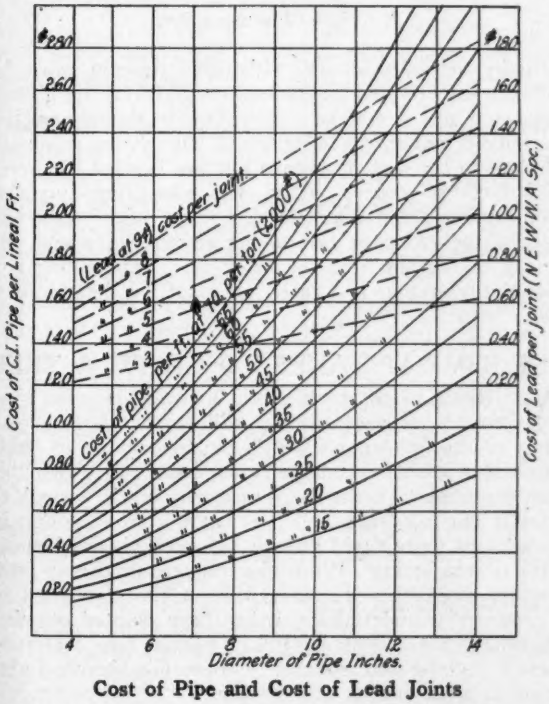
A Short Cut for Estimating, a Device for Handling Rail, Welded Crossing Frogs and a Method of Measuring Cement

A TIME-SAVING PIPE CHART

By F. D. Yeaton

Assistant Engineer, Chicago, Milwaukee & St. Paul, Chicago

IN RAILROAD water supply work it is common practice to use the American Water Works Association's standard Class "B" cast iron pipe. Class "B" pipe is good for 86 lb. per sq. in. pressure, which is equivalent to a 200-ft. head.



Cost of Pipe and Cost of Lead Joints

The accompanying chart gives (a) the cost of Class "B" cast iron pipe per lineal foot for various diameters for prices ranging from $15 to $70 per net ton, (b) the cost of lead per joint for various diameters of pipe, based on the New England Water Works Association's specifications, for prices ranging from 3 to 9 cents per lb.

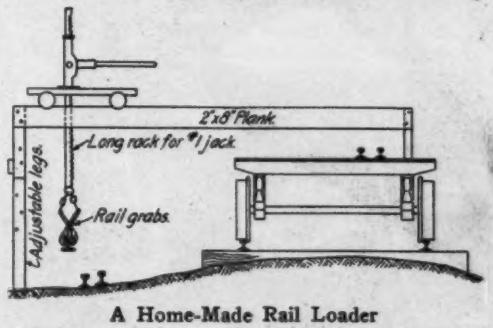
If one has considerable estimating to do the chart will be found very convenient, also a time saver. Knowing the price of pipe and the diameter, one can read off the cost per lineal foot direct. Without the chart it is necessary to look up the weight of the pipe per lineal foot for each diameter of pipe needed and then multiply by the cost per net pound and divide by 2,000. Similar charts for Classes A, C and D can be easily worked up if needed.

A TWO-MAN RAIL LOADER

By C. S. Lusk

Section Foreman, Erie, Alfred Station, N. Y.

IN THESE days when track forces have been cut to a mere skeleton, section foremen are often at a loss to know how to get work done that is ordinarily assumed to require the combined efforts of four or five men. As an illustration of what may be accomplished along this line with the help of some special equipment, it may be of interest to know that I have been able to change out rail with one man this winter by getting protection from the train dispatcher and using the rail handling rig shown in the drawing. This consists of a track jack with a special long rack mounted on a trolley that travels on a plank supported on two legs. One is a short leg that rests on the push car and the other is a long leg that rests in the ditch. The operation of this rig is so simple as to require practically no explanation. The long rack was furnished me by the Duff Manufacturing Company of Pittsburgh for experimental use and is exactly the same as a regular jack except for the length of 3½ ft. and provision for a hook for the rail grab at the lower end. For purpose of safety a link is provided to drop down on the top dog of the jack to lock it as soon as the jack has been raised high enough for the rail to clear the push car.



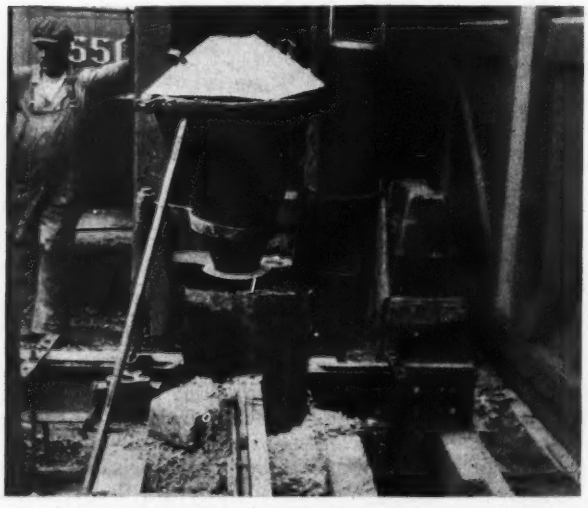
A Home-Made Rail Loader

THERMIT-WELDED CROSSING FROGS

WHILE WELDED crossing frogs are not particularly new in the electric railway field, they are more or less so in steam railway work. For that reason a recent installation of thermit-welded frogs on an intersection of the Chicago, Burlington & Quincy with a street railway at St. Joseph, Mo., will be of interest.

An Example of a Weld

In welding railroad crossing frogs the ends of the rail pieces which form the frog are cut to the desired shape with an oxy-acetylene torch. They are then lined up together and clamped on a layout bed, leaving a slight opening at the frog for the insertion of some yellow pattern wax which is molded to the shape of the desired weld. The molds are then constructed around the wax



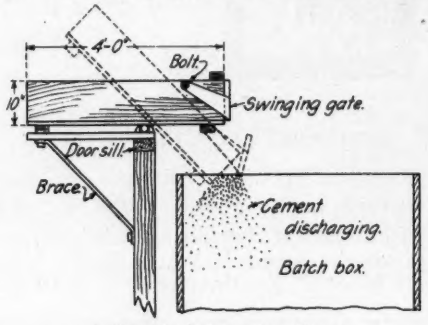
Ready to Pour the Metal

pattern and a wooden riser and pouring gate pattern inserted to allow space for the metal to be poured into the weld. These wooden patterns are later removed and the wax burned out of the mold by means of a preheating torch, which also serves to heat the rail ends, bringing them to a good red heat, suitable for welding.

A charge of thermit is deposited in a crucible suspended over the mold and ignited. A chemical reaction takes place, during which the iron is set free as a liquid steel at approximately 5,000 deg. F. This liquid steel is then tapped and allowed to flow through the bottom of the crucible into the mold, where it amalgamates with the rail sections to be welded, so that when cool the mass forms a homogeneous section as shown.

MEASURING BULK CEMENT

BULK CEMENT is used to a greater extent on highway work at the present time than on railroad work. However, methods for handling this material on road work may be applicable on the railroads. For instance, a method for measuring bulk cement to get the required proportions for batch mixing has been devised that may be used most anywhere. The following is taken from an article appearing in Engineering and Contracting for February. The device is shown in the illustration and is



A Simple Measuring Box

virtually self-explanatory, although attention must be called to the fact that the dimensions given are for a four-bag batch and should, of course, be considerably smaller if a smaller mixer was being used. This device is mounted close to the cement storage bin and is filled by means of buckets or scoops. After the measuring tray has been filled to the required level, a slight pull tilts the box causing the swinging gate to lift automatically and discharge the cement into the batch box. The tilting box should preferably be located at about the height of a man's waist.

THE TIME IT TAKES TO GROW A TREE

AN IDEA of the problem of financing imposed by a project for reforestation will be manifest from a study of the following table giving the number of years required to grow a tree large enough to produce two railway cross ties. This is based primarily on the growth of trees in native forests and it is but fair to state that in some cases more rapid growth has been obtained under artificial conditions. While the time required may seem disappointing when considered from the standpoint of a commercial undertaking, it has been pointed out that the time is not long in the life of nations and, therefore, there is nothing unreasonable or impossible about reforestation as a national or state project.

	Years		Years
Tamarack	164	Chestnut	50
White pine	60	Cottonwood	25
Western yellow pine	60	Bald cypress	50
Short leaf pine	50	Douglas fir	45
Red pine	70	Hemlock	105
Loblolly pine	40	Hickory	105-125
Chestnut oak	90	Black locust	50
White oak	124	Sugar maple	110
Black oak	60	White ash	60
Beech	170	Cottonwood (aspen)	50
Yellow birch	90	Long leaf pine	70
Red Cedar	62	Slash pine	65

THIS PAGE more than any other in the paper belongs to you, the reader. Therefore, the extent to which is will be of value to you depends almost entirely on the extent to which you co-operate in submitting the questions that perplex you. What are *your* problems?

The same is true of the answers. Based on the contributions received by this department during the four months that it has been in existence, it is clear that almost any question may be answered correctly in more than one way. Experiences and practices on various roads and in different localities vary widely. Therefore, the greater good will come with a variety of answers to each question. What is *your* answer?

A LINE RAIL IS ESSENTIAL

What advantage is there, if any, in considering one of the track rails as a line rail?

If track was always true to gage there would be no particular advantage in considering one track as a line rail, but, as everyone knows, there is more or less variation in the gage. Consequently, to attempt to line track by one rail and then by the other is pretty sure to result in confusion. If, on the other hand, one rail is always used as the line rail, all the irregularities resulting from variations in gage are thrown onto the other rail, and if the line rail is exactly to line, the gage can be corrected in the other rail.

D. CAMERON, assistant engineer, Chicago, Burlington & Quincy, Chicago.

SHOULD TIES BE DAPPED OR SHIMMED?

Should ties on a deck girder be sized or shimmed to take up the variation in the thickness of cover plates?

FIRST ANSWER

The distance between the cover plate and the base of rail at the center of the deck girder is less than at the end of the girder in all cases where more than one cover plate is used. This difference must be made up either by using ties of various thicknesses or by notching or dapping the ties where the cover plates are thicker or by using a combination of these two methods. Another plan is to provide ties of the depth necessary where the cover plates are the thickest and make up the deficiency in depth near the ends of the span by providing shims. The latter plan is the cheaper because it takes less material and because the shims can be applied at less expense in labor than is necessary to size the ties to the required depth.

The difficulty with the latter method is in maintaining the shims to insure that they do not split up and fall out. The shimmed tie does not possess the same security against lateral shifting as is the case with the tie that is dapped over the cover plate. Some roads, however, observe this method as a standard practice.

C. N. BAINBRIDGE, engineer of design, Chicago, Milwaukee & St. Paul, Chicago.

SECOND ANSWER

If shims are used, the full section of the ties bought and paid for is available for carrying the load. If the ties must be sized, it is necessary to order them thicker by the amount of the dap than is required for strength, since the dapping or gaining removes a large part of the strength resulting from the increased depth. By making the shims two feet long, so that they project well beyond the flanges of the girder, the tendency to split is greatly reduced, while the chance of a shim falling out is very remote. Moreover, its condition can readily be determined at any time by inspection.

R. E. SHEEHAN, superintendent of bridges, Chicago, Burlington & Quincy, Chicago.

PROTECTING THE FLOOR FROM SPARKS

What is the most practical protection for the floor under a station stove?

The floor under a station stove, particularly if soft coal is burned, must be protected against falling sparks or live coals and a variety of arrangements have been made to provide this protection. The simplest of these is a sheet of sinc tacked to the floor. This will do very well for a hard coal fire but it is not usually considered enough protection for a soft coal fire, owing to the greater

Questions to be Answered in June?

The following questions have been submitted and will be answered in the June issue:

(1) Can a roadmaster learn more about the condition of line and surface by riding in an engine cab than by riding on the back end of a train?

(2) Should a concrete mixer that is used for culvert, station platform and similar work, and frequently moved from place to place on cars, be mounted on wheels or on skids?

(3) What is the most serviceable floor finish for a hard wood floor in stations of medium size?

(4) What is the most practical way of packing a 2-in. shaft where it passes through the side or bottom of a wooden water tank?

possibility of sparks which are very likely to roll or bound off the zinc onto the floor. Probably the most common form of protection is a cast iron pan set on the floor under the stove legs like a saucer under a cup, or it may consist of a projection on the side of the pedestal supporting the stove. Its advantage is that its steep sides keep the sparks or coals from rolling onto the floor. A cheaper arrangement is a wooden box filled with a layer of sand, but this has the objection that it is hard to keep clean, as patrons of the station will use it as a spittoon or depository for peanut shells, banana peels, etc. Another arrangement is a basin or a flat slab of concrete either set up on top of the wooden floor or depressed in it.

This problem is being solved in the better stations by eliminating the stoves entirely, but, of course, in a great many of the smaller stations it is a broblem that must still be met for a long time.

PETER AAGAARD, President, T. S. Leake Construction Company, Chicago.

DRAINING A ROADSIDE TANK

What is the most serviceable device for the bottom of a wooden roadside tank to facilitate draining and cleaning?

FIRST ANSWER

Water that remains in the tank after the level has been lowered to the top of the regular service outlet must be removed through another opening flush with the bottom of the tank that is closed with a blind flange or plug. When the turbidity of the stream is very high, considerable trouble will be experienced with mud accumulating in the roadside tank. An excellent means for removing the mud in such cases is to install a sludge system in the bottom of the tank. This sludge system may be similar to that used in lime-soda-ash water treating plants. A system of this kind was installed at Chamberlain, S. D., where the water for locomotives is taken from the Missouri river. This consists of an 8-in. pipe extending across the bottom of the tank with two inch lateral pipes spaced about 2 ft. 6 in. center to center, forming a grid, these lateral pipes having holes one-half inch in diameter in the top face at intervals of one foot. The eight inch main pipe has an outlet through the bottom of the tank equipped with a suitable valve. This system, of course, is one that runs into considerable money and is only justified in the case of water of unusual turbidity.

F. D. YEATON, assistant engineer, Chicago, Milwaukee & St. Paul, Chicago.

SECOND ANSWER

It is the general practice in building roadside tanks to extend the outlet pipe several inches above the tank floor to provide a space for the deposition of sediment that would otherwise pass (often in concentrated form) directly into the locomotive boiler. Where such an arrangement is made it is very often advisable to provide some device in the tank by means of which the water and sediment below the level of the regular outlet can be removed. Otherwise the cleaning of the tank necessitates the expensive and cumbersome method of baling the water out by hand and removing the sediment with buckets. The nature of the device will depend upon conditions. Often a wooden plug driven into the opening in the floor is relied upon for this purpose. But where other equipment is at all available, this practice is usually to be condemned. The plug, when driven into the hole, immediately begins to swell and as a result becomes difficult to remove. A method which has been used successfully for the average condition is that of bolting two pipe flanges to the floor, one on each side of the hole, screwing a nipple into the lower or outside flange, and closing the opening with a pipe plug screwed into the upper flange. This plug is fitted with an eye bolt long enough to extend well above the level of the outlet pipe and secured against loosening by jam nuts on the inside and outside of the plug. This device can be installed at small expense and if assembled properly can be relied upon to work when needed. The fittings should be for 3-in. pipe or larger to allow the use of a plug and eye bolt having enough stock to protect the system against stripping of the threads as well as to afford ample discharging capacity.

SUPERVISOR OF WATER SERVICE.

LARGE INCREASES IN WAGES OF EMPLOYEES

STATISTICS recently compiled by the Interstate Commerce Commission and the Bureau of Railway Economics show that the average number of railroad employees during the six months from January to July, 1920, was 1,999,142, an increase of 266,266 over that for the year 1917. The same statistics show that the total compensation for this period exclusive of that received as back pay was $1,596,680,238. Upon the basis of this figure, together with $625,000,000, the estimated annual wage increase awarded by the Labor Board, the annual payroll rate reaches a total of $3,818,000,000, as compared with $1,739,482,142 for 1917.

One of the interesting things about the statistics of the Bureau of Railway Economics is the disclosure that a large increase occurred in the number of employees who work under the national agreements and who received great increases in wages. This naturally gave rise to the inference that the increases in wages materially reduced rather than increased the efficiency of these employees.

Figures in the accompanying table show the increases and the average annual wages received by various classes of employees in the Maintenance of Way Departments of the Class I railroads. It will be noticed that the average wage of all the classes listed were increased over 100 per cent.

EMPLOYEES AND THEIR COMPENSATION—CLASS I RAILWAYS. 1917 AND 1920

Class of employees	1917 Average number of employees	1917 Total compensation	1917 Average compensation	1920 (Including wage award for entire year) Average number of employees	1920 Total compensation	1920 Average compensation
Masons and bricklayers	1,361	$ 1,269,437	$ 933	1,040	$ 1,988,839	$1,912
Structural ironworkers	885	897,720	1,014	586	1,286,408	2,195
Carpenters	53,084	49,870,186	939	51,998	101,693,500	1,956
Assistant engineers and draftsmen	11,989	13,722,480	1,145	10,217	19,227,124	1,882
M. W. & S. foremen	8,038	9,619,428	1,197	8,148	19,646,402	2,411
Section foremen	40,368	35,744,163	885	41,522	77,210,233	1,860
Section men	241,435	145,164,191	601	255,526	310,585,913	1,215
Foremen of const. gangs and work trains	2,567	2,648,162	1,032	1,497	3,599,994	2,405
Other men in const. gangs and work trains	36,759	22,957,221	625	20,598	30,309,978	1,472
Crossing flagmen and gatemen	15,976	8,548,073	535	23,123	28,254,788	1,222

ANOTHER PLAN—Advanced methods in conducting railroad transportation which, it is stated, will produce far-reaching results, will insure annual savings of millions of dollars, increase facilities and service, and lower railroad rates, were outlined to Senator Cummins on March 21. S. D. Warfield stated that unless intensive economical methods in railroad administration are adopted there is no alternative but government operation, followed by government ownership, although the country has given overwhelming evidence of being opposed to it.

The American Railway Engineering Association

Although only two weeks have elapsed since the annual convention, the Board of Direction has the work for the ensuing year so well in hand that the outline of work for the committees and the personnel of the committees themselves have been practically completed. No new committees have been created, although the Committee on Conservation of Natural Resources has been abolished. In accordance with the custom of past years from 10 to 25 per cent of the personnel of the committees has been changed, while a number of new chairmen have also been selected. It is expected that the complete roster of subjects and the personnel of committees will be completed for publication within the next month so that the committee work may proceed promptly.

Bridge and Building Association

Advantage was taken of the presence of a considerable number of the members of the association at the convention of the American Railway Engineering Association to hold an informal meeting of the executive committee and interested members in the Congress Hotel on Wednesday afternoon, March 16. At this meeting a report was presented by the Arrangements committee for the next annual meeting and the Hotel McAlpin, New York City was selected as headquarters.

Wood Preservers' Association

A get-together meeting of those members of the association who attended the annual meeting in San Francisco, and those who desired to attend but were unable to do so, was held at the Hotel Sherman, Chicago, on the evening of March 15, following an all-day meeting of the Executive committee. Approximately 65 members were present at the dinner. The evening was spent in a discussion of the problems of interest to the association, in talking over the events of the recent convention and in planning for the work for the ensuing year.

It is planned to hold a meeting at the Forest Products Laboratory, Madison, Wis., during the summer. At the meeting of the Executive committee, H. E. Horrocks, manager, Pacific Creosoting Company, Seattle, was elected a member of the Executive committee to fill a vacancy created by the election of H. S. Valentine to a position of vice-president at the last annual meeting.

The Roadmasters' Association

A number of committees are actively at work on the preparation of their reports for presentation at the annual meeting in September. Efforts are being made to have these reports in shape for tentative presentation to the Executive committee at a meeting which will be held early in the summer. Over 50 members of the association were present at a dinner given at the Auditorium hotel, Chicago, on the evening of March 16, at which time the necessity for aggressive determined work in the preparation of these committee reports and also in the day-to-day duties on their individual railroads was emphasized at length.

THE MATERIAL MARKET

THE PRESENT aspect of the material market is one of further declines in price and a continued scarcity of business. However, an examination of the table of iron and steel prices below goes to show that most of the decline has been in items not concerning the railroads primarily, while in those items which are exclusively railway, namely, track fastenings, there has been a rather close adherence to the schedule established by the United States Steel Corporation. This condition is possibly a reflection of the fact that the rail orders placed by the roads for 1921 delivery constitute an important tonnage for the steel industry at the present time and that the orders for the supplementary items of track fastenings comprise more tangible business than that to be had in some other lines. Taking the steel industry as a whole, the present rate of purchasing is said to represent about 25 per cent of the production capacity.

	Prices in Cents Per Pound			
	February 29		March 21	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	3.65	4.03	3.25 to 3.65	4.03
Track bolts	....	4.98	4.90	4.98
Angle bars	2.75	2.75	2.75	2.75
Tie plates, steel	....	2.75 to 3.00	2.75	2.75 to 3.00
Tie plates, iron	....	3.00	....	3.00
Plain wire	3.00 to 3.25	3.63	3.00 to 3.25	3.38 to 3.63
Wire nails	3.10 to 3.25	3.63	3.00 to 3.25	3.38 to 3.63
Barbed wire, galv.	....	4.33	3.85 to 4.10	4.18 to 4.33
C. I. pipe, 6 in. or larger (per ton)	....	64.10	....	64.10
Plates	2.25 to 2.65	2.63 to 3.03	1.95 to 2.65	2.38 to 3.03
Shapes	2.20 to 2.45	2.63 to 2.83	2.00 to 2.45	2.48 to 3.83
Bars (steel)	2.10 to 2.35	2.35 to 2.73	1.95 to 2.35	2.38 to 2.73

The scrap market has suffered further reductions ranging from $1 to $2.50 per ton, so that the prices now are lower than they have been at any time during the war period.

	Per Gross Ton	
	Chicago	St. Louis
Relaying rails	$32.50 to $37.50	$35.00 to $40.00
Rerolling rails	13.00 to 13.50	13.50 to 14.00
Rails less than 3 ft. long	14.00 to 14.50	13.50 to 14.00
Frogs and switches, cut apart	12.50 to 13.00	13.00 to 13.50
	Per Net Ton	
No. 1 railroad wrought	11.50 to 12.00	11.00 to 11.50
Steel angle bars	12.00 to 12.50	11.50 to 12.00

Price changes in the lumber market seem to alternate between the West coast and the Gulf coast districts. Last month reductions were recorded in Douglas fir prices, but these have been stationary for the last four weeks, while reductions of as much as $4 per thousand ft. are to be noted in the prices of Southern pine. These are, of course, the mill prices, since the declines in prices by the local distributors are still lagging behind those of the producers.

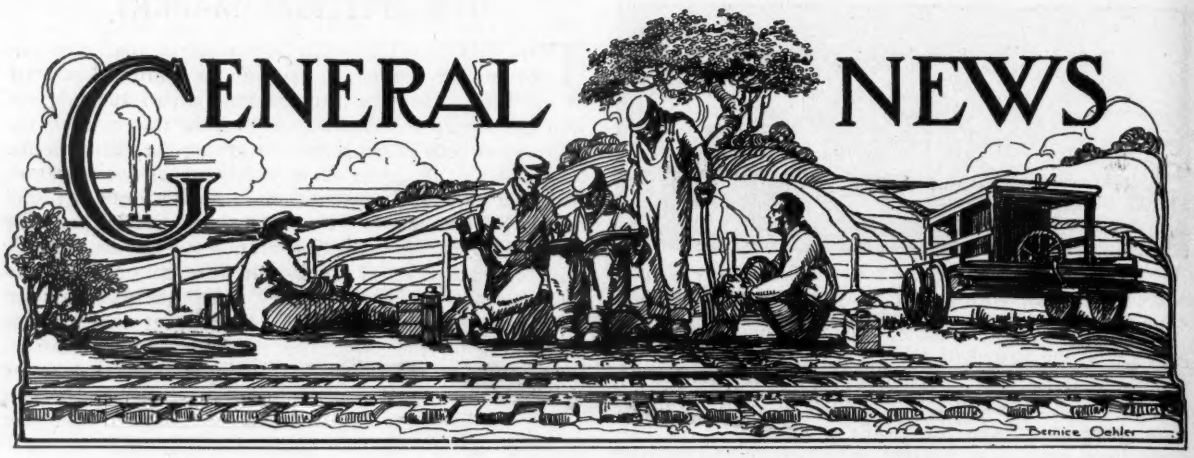
Southern Pine Mill Prices

	February	March
Flooring, 1 x 4, B. & B., flat	$34.84	$33.30
Boards, 1 x 8, 14 & 16, No. 1	30.61	26.04
Dimension, 2 x 4, 16, No. 1	21.72	21.47
Dimension, 2 x 10, 16, No. 1	21.53	21.86
Timbers, 4 x 4 to 8 x 8, No. 1	24.93	22.69
Timbers, 3 x 12 to 12 x 12, No. 1	32.75	29.88

Douglas Fir, Seattle Prices

Flooring, 1 x 4, No. 2, clear, flat	$23.00	$23.00
Boards, 1 x 6, 6 to 20, No. 1, common	13.50	13.50
Dimension, 2 x 4, 16, No. 1, common	13.50	13.50
Dimension, 2 x 10, 16, No. 1, common	13.50	13.50
Timbers, 6 x 6 to 8 x 8, No. 1, common	20.00	20.00
Timbers, 10 x 10 to 12 x 12, No. 1, common	21.00	21.00

No recent change has been noted in the Portland cement market.



On March 29 President Harding asked E. E. Clark, chairman of the Interstate Commerce Commission, and R. M. Barton, chairman of the Railroad Labor Board, to confer with him at once on the present plight of the railroads.

The Tax Bureau of New York State estimates that the state income tax yield for 1920 from railroad employees, who were exempt from payment of the tax in 1919 on account of government operation of the railroads, will amount to $1,000,000.

Considerable excitement prevailed at the annual meeting of the Pennsylvania Railroad Company on March 9 when H. E. Alexander, a stockholder, introduced a resolution directing the discontinuance of passes to employees. The resolution was referred to the directors without dissent.

Employees on 15 divisions of the Chicago, Rock Island & Pacific during 1920 leased a total of 1,078 acres of ground for "Right-of-Way Gardens," the individual lease averaging 2.65 acres. Despite the cessation of war pressure which created the war garden plan of food production, this plan has been continued on the Rock Island.

The Indiana Appellate Court holds, in a crossing accident case, where an electric gong installed by the railroad at the crossing did not ring, that knowledge of the railroad that the gong was out of repair and want of knowledge on the part of the traveler, are both essential to recovery for failure to use reasonable care to keep the gong in good condition.

It is understood that President Harding is planning a trip to Alaska this summer to make a personal study of conditions, including the Alaska government railroad. A plan has been under consideration to complete the railroad as rapidly as possible and for the operation by the government of a steamship line between Alaska and various ports on the Pacific coast.

The Indiana Appellate Court holds that a member of an automobile party which had been drinking intoxicating liquors, who knew of the intoxicated condition of the driver in time before a crossing was reached to have left the automobile and avoided injury when it was struck by a train, was guilty of contributory negligence, barring recovery; and this whether warning signals were given by the railroad or not.

On account of the failure of the Mexican administration to recognize what is described as a radical union of all classes of railway workers, a general strike is in effect. It would appear that there is considerable violence in connection with the strike as it is reported that bridges have been blown up, engines disabled and attempts have been made to destroy railway buildings. It is also reported that a number of strikers have been executed for deeds of violence.

The Railway Association of Canada has recently been considering the possibility of further protecting maintenance of way department employees against accidents, resulting from being struck by trains. It has also recommended to member lines not equipped with whistle posts where the view of the track ahead is obstructed by curves, that the following instructions be issued to locomotive crews: "Engineers on all trains shall sound whistle when approaching curves where view of track ahead is obscured."

What was probably the most disastrous grain elevator explosion ever recorded occurred at the terminal grain elevator of the Chicago & North Western on the Calumet river, Chicago, on March 19, resulting in the death of six persons and a loss in the elevator and its contents estimated at about $4,000,000. This explosion resulted in destroying the enormous cupolas and galleries over the 223 cylindrical concrete storage bins of the structure. A number of bins were also destroyed and a great many of them have been cracked or otherwise injured. An idea of the severity of the explosion is indicated by evidence that the grain tanks were lifted several inches off their foundations.

A new passenger station for Cleveland is the subject of an application recently filed with the Interstate Commerce Commission by the New York Central. The application provides for the immediate construction of a terminal to be used initially by the New York Central, the Cleveland, Cincinnati, Chicago & St. Louis and the New York, Chicago & St. Louis, but of such size and so located as to accommodate and be readily accessible to all other roads desiring to avail themselves of it. At the outset a station is to be constructed covering 20 acres with property available for a 10-acre addition. The length of the terminal including the passenger station and its approaches is to be about 3½ miles with an initial trackage for steam and suburban roads of 14 and 9½ miles, respectively, with allowance for additions to the extent of 10 and 8 miles. The terminal track and platform layout will be 30 ft. below the level of the Public Square with a service floor for waiting rooms, etc., 10 ft. below the street, and these facilities will be surmounted by a 12-story office building.

The City of San Francisco, Cal., is the owner and operator of a standard gage steam railroad. This road begins at a junction with the Sierra Railroad, 26 miles east of Oakdale and continues coastward in the mountains a distance of 68 miles to the Hetch Hetchy water supply and power project, it being the primary purpose of the road to transport the construction materials for this project. As the road cost $2,000,000 or $30,000 per mile, the city is anxious to get as much return as possible from revenue transportation and with 258,000 tons of freight to be moved it is estimated that the road will be able to charge off some of the investment. Thus far freight is hauled at a cost of six cents per mile as compared with a figure approaching 60 cents for motor transport. With maximum grades and curvatures of 4 per cent and 30 deg. respectively, it is necessary to employ a locomotive of special construction, the locomotive used being a type of 90-ton Mikado built by the American Locomotive Company. The country traversed by the road is attractive both from scenic and lumbering standpoints and it is expected that business will develop from these sources. Eventually the Southern Pacific or the Santa Fe is expected to take over the operation of this system.

PERSONAL MENTION

ENGINEERING

W. D. Simpson has been appointed division engineer of the Florida division of the Seaboard Air Line, effective March 1, succeeding **B. Land, Jr.**, resigned.

C. C. Haire has been appointed engineer auditor on the Illinois Central, with headquarters at Chicago, with jurisdiction over valuation and capital expenditures.

Guy C. Dunn, formerly engineer of construction on the Grand Trunk Pacific, has been appointed assistant to the chief engineer of the Canadian National Railways, Eastern Lines, with headquarters at Toronto, Canada.

J. A. Gorr, division engineer of the Shreveport division of the Louisiana lines of the Southern Pacific, has been transferred to the Lafayette division, Lafayette, La., succeeding **J. A. Lambert,** resigned.

C. T. Jackson, whose promotion to principal assistant engineer of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, was announced in the March issue, was born at Miami, Mo., on July 13, 1881, and graduated from the University of Missouri in 1903. He entered railway service in the same year as an instrumentman on the Montana Railroad, and when this road was purchased by the Chicago, Milwaukee & St. Paul, Mr. Jackson remained in the employ of the latter company. From 1905 to 1909 he served as assistant engineer and locating engineer, being engaged in the construction of the Coast extension of the St. Paul. In 1909 and 1910 he was assistant engineer on the LaCrosse division, and in the latter year was appointed locating engineer, in which capacity he served until his appointment as district engineer on the building of the line from Lewistown, Mont., to Great Falls. In 1915 he was appointed pilot engineer in connection with valuation work. Later he was made district engineer, with headquarters at Butte, Mont., being subsequently transferred to Chicago. He was serving in the latter capacity at the time of his recent promotion.

C. T. Jackson

A. L. Grandy, assistant general manager of the Pere Marquette, with headquarters at Detroit, Mich., has been appointed chief engineer and the position of assistant general manager has been abolished. **Job Tuthill,** chief engineer, has been appointed assistant chief engineer.

E. Y. Allen, valuation engineer of the Central Railroad of New Jersey and the Philadelphia & Reading, with headquarters at New York City, will devote his entire time to the department of valuation of the latter road. **W. W. James,** assistant valuation engineer of the Central Railroad of New Jersey, has been appointed valuation engineer, succeeding Mr. Allen.

G. W. Abbott, division engineer of the Boston division of the Boston & Albany, with headquarters at Boston, Mass., has been promoted to principal assistant engineer, with headquarters at South Station, Boston, succeeding **E. S. Draper,** deceased. **W. B. Knight,** division engineer of the Albany division, with headquarters at Springfield, Mass., has been transferred to the Boston division, with headquarters at South Station, Boston, succeeding Mr. Abbott. **E. K. Mentzer,** supervisor of track on subdivision No. 1, has been promoted to division engineer of the Albany division, with headquarters at Springfield, Mass., in place of Mr. Knight. **E. G. Hartford,** assistant engineer, has been promoted to office engineer, with headquarters at South Station, Boston, succeeding **F. A. Jones,** whose promotion to supervisor of track is noted elsewhere in these columns.

W. P. Hayes, assistant engineer on the Missouri Pacific, with headquarters at Monroe, La., has been promoted to division engineer on the Louisiana division, with the same headquarters. **R. G. Bush,** assistant engineer in the valuation department, with headquarters at St. Louis, Mo., has been appointed assistant engineer on the Valley division, succeeding **N. B. Topping,** who has been assigned to other duties.

R. O. Rote, assistant chief engineer of the New York Central, Lines West, with headquarters at Cleveland, Ohio, will take over the duties of **H. B. Reinsagen,** engineer maintenance of way, whose position has been abolished. Mr. Reinsagen has been appointed principal assistant engineer, with headquarters at Cleveland, Ohio, succeeding **A. M. Currier,** and Mr. Currier has been made engineer grade separation, succeeding **C. F. Mayer,** who has been assigned to other duties.

G. H. Ballantyne, resident engineer on the Western Pacific, with headquarters at Sacramento, Cal., has been promoted to acting chief engineer, succeeding **T. J. Wyche,** who has been granted a leave of absence on account of illness. Mr. Ballantyne graduated from the University of Illinois in 1907, following which he was employed as an assistant engineer on maintenance of way work on the Chicago, Burlington & Quincy until 1911. In that year he was made a division engineer on the Western Pacific, with headquarters at Elko, Nev., which position he held until 1913, when he was assigned to valuation work. During 1916 and 1917 he was engaged in location and construction work for the same railway. He was again appointed division engineer at Elko, Nev., in 1918 and was later transferred to Sacramento, Cal. During 1920 and until his recent promotion to acting chief engineer he has been in charge of the construction of the San Jose branch.

George W. Abbott, whose promotion to principal assistant engineer of the Boston & Albany, with headquarters at Boston, Mass., is noted elsewhere in this issue, was born in Syracuse, N. Y., on October 7, 1876. Previous to entering railroad service, Mr. Abbott served for five years in various engineering capacities with the state engineer for the New York State Canal Works, the City of Fulton, N. Y., and as assistant city engineer of Rome, N. Y. He entered railway service with the New York Central as a transitman at Albany, N. Y., in 1901, and continued to serve in that capacity until 1903, when he was promoted to draftsman. In 1904 he was promoted to assistant supervisor of bridges and buildings, being again promoted one year later, or in 1905, to assistant engineer. In this capacity he was assigned to grade crossing work, continuing at this work until 1907, when he was transferred to the Boston & Albany. In 1910 he was promoted to assistant designing engineer, serving the Boston & Albany in this position until 1913, when he was promoted to division engineer. Mr. Abbott served as division engineer until March 1, 1921, his most recent headquarters being at Boston, Mass., where he was located at the time of his promotion to principal assistant engineer.

George P. McLaren, district engineer on the Canadian National Railways, with headquarters at Toronto, Ont., has been promoted to engineer maintenance of way, Eastern Lines, with the same headquarters. **C. H. N. Connell,** district engineer on the Canadian National Railways at Quebec, has been transferred to Toronto as district engineer, and will have jurisdiction over all lines in the Province of Ontario. **L. Brousseau,** division engineer at Levis, Que., succeeds Mr. Connell at Quebec. **R. A. Clark,** resident engineer on the Canadian National Railways, with headquarters at Campbellton, N. B., has been appointed division engineer, with headquarters at Truro, N. S., succeeding **R. H. Smith,** who has been transferred to Campbellton, N. B., in place of **R. A. Black,** transferred. The title of resident engineer on the Eastern Lines has been changed to division engineer. **E. M. Johnson,** special engineer, Western Lines, with headquarters at Winnipeg, Man., has been assigned to the preparation of

frog and rail standards, since the return of **J. W. Porter**, special engineer, to his former position. **K. G. Polybank** has been appointed division engineer, with headquarters at Hornepayne, Ont., succeeding **E. R. Logie.**

TRACK

J. H. Anger, supervisor of tracks on the New York Central, with headquarters at Lyons, N. Y., has been transferred to Canandaigua, N. Y., succeeding **D. L. Robertson,** who has been transferred to Lyons.

William E. Fitzsimons, assistant roadmaster of the St. Paul division of the Northern Pacific, with headquarters at St. Paul, Minn., has been promoted to roadmaster of the Dakota division, with headquarters at Carrington, N. D. Mr. Fitzsimons was born at St. Paul, Minn., in 1885, and entered railway service in 1905 with the Northern Pacific as a chainman, subsequently serving as rodman and assistant engineer. In June, 1917, he was promoted to roadmaster at Fargo, N. D., and in June, 1919, was transferred to St. Paul as assistant roadmaster, which position he held until his recent promotion.

J. R. Pinkerton has been appointed roadmaster on the Missouri Pacific in charge of the territory from Hoxie to Austin, Ark., with headquarters at Newport, Ark. **E. H. Grubb** has been appointed roadmaster in charge of the line from Smithton to Texarkana, with headquarters at Gurdon, Ark. **J. Y. Dollar** has been appointed roadmaster, with supervision over the line from Benton to Smithton, including the Womble and Pike City branches, with headquarters at Gurdon, Ark. **M. Leonard** has been appointed roadmaster of the Little Rock terminals, with headquarters at North Little Rock, Ark., and **M. J. Dillon** has been appointed roadmaster in charge of the line between Austin and Benton, exclusive of Little Rock terminal, and of the territory from Pine Bluff to Hot Springs, with headquarters at Little Rock, Ark.

Ernest H. Grubb, whose appointment to the position of roadmaster on the Missouri Pacific, with headquarters at Gurdon, Ark., is noted elsewhere in this issue, was born at Dresden, Tenn., on October 19, 1880. He entered railway service with the St. Louis Southwestern in June, 1898, as a section laborer, subsequently serving as section foreman, timekeeper and extra gang foreman until March, 1908. From that date until September, 1908, he served as extra gang foreman for the Louisiana & Arkansas. He was employed by the Missouri Pacific at the latter date as section and extra gang foreman, leaving in October, 1918, to go with the St. Louis Southwestern as roadmaster, in which capacity he was serving at the time of his recent appointment.

A. L. Bachar, whose promotion to roadmaster on the Montello district of the Southern Pacific, with headquarters at Montello, Nev., was noted in the March issue, was born at Glenwood, Iowa, on January 12, 1885. He entered railway service as a section laborer on the St. Joseph & Grand Island on March 17, 1902, and on November 4, 1903, entered the service of the Missouri Pacific in the same capacity. From March 25, 1905, until March 19, 1907, Mr. Bachar served as section foreman and assistant foreman on extra gangs on the Atchison, Topeka & Santa Fe. On April 4, 1907, he became section foreman on the Southern Pacific, but returned to the Atchison, Topeka & Santa Fe on February 1, 1908, as section and extra gang foreman. From December 1, 1912, to March 1, 1921, he served as extra gang foreman and section foreman on the Southern Pacific, being promoted to roadmaster on the latter date.

Guy M. DeLambert, assistant roadmaster on the Minnesota division of the Northern Pacific, with headquarters at Staples, Minn., has been promoted to roadmaster of the Lake Superior division, with headquarters at Duluth, Minn. Mr. DeLambert was born at Brainerd, Minn., on January 29, 1891, and received his education at the University of Minnesota. He entered railway service on May 4, 1908, as a chainman on the Northern Pacific, which position he held until September, 1909. From June, 1910, until December, 1911, he served as a rodman on the Great Northern, being appointed resident engineer of the Canadian Northern on the latter date. He served as transitman for the Minnesota State Highway Commission from May, 1915, until his appointment as rodman on the Northern Pacific in September, 1915, serving subsequently as inspector and instrumentman. In May, 1917, Mr. DeLambert was promoted to assistant roadmaster and in January, 1921, was made acting roadmaster, which position he held at the time of his recent promotion.

F. A. Jones, whose promotion to supervisor of track on the Boston & Albany is noted elsewhere in these columns, was born at Needham, Mass., on February 26, 1876. Mr. Jones graduated from the Massachusetts Institute of Technology in 1898 and in August of that year entered railway service as a rodman on the Chicago Great Western. He served on this road as a rodman and later as an assistant engineer until 1901, when he left the Chicago Great Western to go with the New York Central. While in the employ of the latter road he held consecutively the positions of transitman, assistant supervisor of track and assistant engineer. In 1905 he left that road to accept a position as division engineer on new construction with the Virginian. In 1908 he was promoted to terminal engineer in charge of the construction of the new coal piers at Sewells Point, where he served until 1909, when he entered the employ of the Boston & Albany as a draftsman. He was subsequently promoted to assistant engineer and office engineer, remaining in the latter position until his recent promotion to supervisor of tracks.

BRIDGE

S. C. Tanner, master carpenter on the Baltimore & Ohio, with headquarters at Baltimore, Md., has been appointed superintendent of the maintenance of way shops at Martinsburg, W. Va.

Samuel Michaels, bridge and building foreman on the Northern Pacific, has been promoted to supervisor of bridges and buildings, with headquarters at Tacoma, Wash., succeeding **J. A. Campbell,** who is on leave of absence.

J. R. Anderson, supervisor of bridges and buildings on the Norfolk & Western, with headquarters at Bluefield, W. Va., has been promoted to chief inspector of bridges and buildings, with headquarters at Roanoke, Va., succeeding **A. E. Gettys,** retired.

OBITUARY

David M. Edgerton, a well-known builder of railroads, died at Chicago, March 10, aged 86 years. Colonel Edgerton's career goes back to the pioneer days of railroad building, having built the Kansas Pacific Railroad, one of the first roads west of the Mississippi River. He served successively as president of the Denver Pacific, the Junction City and Fort Kearney, the Solomon Valley and many other of the earlier western railroads, now long since absorbed by the larger systems.

Plans for a drastic rearrangement of all of the railway terminals occupying the area immediately south of Chicago's business center have been submitted to the mayor and city council of Chicago by the Chicago Railway Terminal Commission, of which John F. Wallace is the chairman. This plan involves a straightening of the Chicago river between Polk street and Sixteenth street in an area occupied almost exclusively by the railroads. It also implies the removal of all railway terminal developments of the railroads in the area north of Roosevelt road between the Chicago river and State street, as well as a considerable area south of Roosevelt road between State and Clark streets, thereby doing away with the Grand Central, La Salle and Polk street passenger terminals, these facilities to be replaced by adequate passenger terminal developments in connection with the Illinois Central lake front project. The freight terminals to be eliminated will be replaced by an extensive freight house and team track development in the area west of Clark street and south of Roosevelt road. The advantage claimed for this plan from the standpoint of the city would be the extension of four through north and south streets southward from the central business district which are now obstructed by railway properties.

CONSTRUCTION NEWS

The Ann Arbor will replace its woodworking shop at Owosso, Mich., recently destroyed by fire, with a steel fabricated building.

The Atchison, Topeka & Santa Fe and the California, Arizona & Santa Fe have been authorized by the Interstate Commerce Commission to abandon a part of the Barnwell branch in San Bernardino County, California, extending from mile post 30, near Barnwell, to Ivanpah, a distance of 15.18 miles.

This company has authorized the construction of a blacksmith shop at San Bernardino, Cal., with dimensions of 80 ft. by 306 ft., to cost $107,000. The company will also build a lavatory building at Needles, Cal., to cost $22,500.

This road also contemplates the construction of a craneway building with dimensions of 50 ft. by 100 ft. at Topeka, Kan., to cost approximately $13,000.

The Baltimore & Ohio is preparing plans, in co-operation with the city of Dayton, Ohio, for the construction of a viaduct 60 ft. long over the railroad tracks at Springfield Pike, Dayton. A definite time for undertaking the project has not yet been decided on.

The Chicago & North Western contemplates rebuilding its grain elevator on the Calumet River, Chicago, which suffered enormous damage from an explosion on the evening of March 19.

The Chicago Union Station Company will shortly accept bids for the construction of a 260 ft. viaduct at Madison street, Chicago. The company will also widen Canal street 40 ft., between Van Buren street and Jackson boulevard, Chicago.

A contract has been awarded to the Fort Pitt Company, Pittsburgh, for fabricating the structural steel to be used in connection with the work.

This company has awarded a contract to the Chicago Foundation Company, Chicago, for the excavation work in connection with the construction of a new railway mail terminal between Harrison and Van Buren streets and the Chicago river at Chicago. The contract for fabricating the structural steel to be used in this building has been let to the McClintock-Marshall Company, Pittsburgh, Pa.

The Cleveland, Cincinnati, Chicago & St. Louis has prepared plans, in co-operation with the city of Springfield, Ohio, for a subway to eliminate a grade crossing on Main street, Springfield.

This road also contemplates realinement and grade revision in the vicinity of Terre Haute, Ind.

The Illinois Central will extend nine passing tracks on the Paducah district between Central City and Paducah, Ky., at an approximate cost of $75,000. The company has also authorized the extension of passing tracks on the Dubuque district between Freeport, Ill., and Waterloo, Ia., at an estimated cost of $65,000. A new 100-ft. turntable will be installed at Waterloo, Ia., at an estimated cost of $45,000, and another new 100-ft. turntable will be installed at Dubuque, Ia., costing $35,000.

This company contemplates building a passenger station at Gilman, Ill., replacing a structure burned recently. The company also contemplates the construction of passenger stations at Baton Rouge, La., and Grand Junction, Tenn., replacing facilities no longer adequate.

This road is accepting bids for two viaducts at Fort Dodge, Iowa, to cost approximately $30,000 each. The company is also accepting bids for the construction of two bridges at Council Hill, Ill., to cost $60,000.

The Interstate Railroad has been authorized by the Interstate Commerce Commission to construct an extension from Norton, Wise County, Va., to a point about nine miles west of St. Paul in Scott County, a distance of about 25 miles, and a branch line therefrom extending from Coeburn up a stream called Tom's Creek, a distance of 15 miles.

The Jefferson & Northwestern is constructing a freight and passenger station, with facilities also for the general office, at Jefferson, Tex., to replace the joint facilities now being used with the Missouri, Kansas & Texas.

The Kentucky & Tennessee has applied to the Interstate Commerce Commission for a certificate of convenience and necessity, authorizing the construction of an extension in McCreary County, Ky., 2½ miles.

The Missouri Pacific contemplates rebuilding shops at St. Louis, Mo., which were recently destroyed by fire at a loss of $150,000.

The Montana Railroad has applied to the Interstate Commerce Commission for a certificate authorizing the operation of its recently constructed line of six miles.

The Northwestern Pacific will erect temporary structures to replace the machine shop, wood working mill, car repair shop and minor buildings, which were destroyed by fire at Tiburon, Cal., as a definite decision has not been made as to whether a modern shop will be constructed at that point, or some more advantageous location along the line.

The Oregon Short Line contemplates improvements on its station at Twin Falls, Idaho, to cost about $15,000.

The Pacific Fruit Express will build an icing plant at Council Bluffs, Iowa, with a capacity of 50 cars a day.

The St. Louis-San Francisco Employes' Hospital Association contemplates the construction of a new 120-bed hospital at Springfield, Mo., replacing the present structure.

The San Antonio & Aransas Pass is adding a second story to its freight station at Yoakum, Tex.

The Texas & Pacific contemplates improvements and additions to its terminal facilities at Fort Worth, Tex., including new yards, a new freight house and additions to its shops.

The Toledo, St. Louis & Western has awarded a contract for a 300-ton all-steel coaling station, with sanding facilities, at Delphos, Ohio, to the Ogle Construction Company, Chicago.

The Union Pacific, in co-operation with the United States Bureau of Public Roads and the State of Utah, will construct a viaduct over the railroad tracks and a bridge crossing the Weber river at Riverdale, Utah.

The Uvalde & Northern has been denied application by the Interstate Commerce Commission for a certificate of public convenience and necessity for the construction of a line of 37 miles in the counties of Uvalde and Real, Texas.

The Wichita Falls & Southern has received a certificate from the Interstate Commerce Commission, authorizing the construction of a line from Newcastle to Breckenridge, Tex., a distance of approximately 44 miles. Protests against the granting of the certificate were filed by the Eastland, Wichita Falls & Gulf, the Cisco & Northeastern, the Texas & Pacific, and the Gulf, Texas & Western, on the ground that the construction of the new line would reduce their revenues.

IRON AND STEEL

The Atchison, Topeka & Santa Fe has ordered 100 per cent rail joints from the Rail Joint Company for 100,000 tons of rails purchased for installation in 1921.

The Bangor & Aroostook is inquiring for 500 tons of tie plates and for frog and switch material.

The Delaware, Lackawanna & Western awarded a contract to the Shoemaker Satterthwait Bridge Company for 1,900 tons of miscellaneous fabricated steel.

The Indianapolis Terminal has ordered 100 per cent rail joints from the Rail Joint Company for 500 tons of rails ordered from the Illinois Steel Company.

This road has also ordered 500 tons of rails from the Illinois Steel Company.

The Maine Central is in the market for 1,000 tons of tie plates.

The Missouri Pacific has ordered 150 tons of plate girder spans from the American Bridge Company.

The Pittsburgh & Lake Erie is asking for from 1,400 to 1,500 kegs of standard spikes.

SUPPLY TRADE NEWS

GENERAL

The H. K. Ferguson Company, southern department, has removed its offices to Room 218, Healey building, Atlanta, Ga. **Richard W. Alger** is the manager.

The Coleman Railway Supply Company, New York, has been incorporated with a capital of $50,000 by R. Eble, S. Galligan and W. Coleman, 50 Church street, to manufacture railroad equipment.

Dwight P. Robinson & Company, Inc., engineers and constructors, New York, recently opened branch offices in the Dominion Express building, Montreal, Que. **Alexander C. Barker,** vice-president, is in charge of the office.

The Independent Pneumatic Tool Company, Chicago, on February 26, removed its Pittsburgh (Pa.) office from 1208 Farmers Bank building to 718 Bessemer building, corner of Fort and Duquesne Way.

The Track Specialties Company, 29 Broadway, New York, on March 1 appointed the **C. H. Small Company,** Monadnock building, San Francisco, Cal., as its agent at that place and **R. J. Glendinning & Co.,** 1102 Newhouse building, as its agent in Salt Lake City, Utah.

The Blaw-Knox Company will establish a sales office in the southwest, with headquarters in the Interstate building, Kansas City, Mo. **R. B. Randall** of the Chicago office will be in charge of the new territory.

The Howlett Construction Company, 208 Sohrbeck building, Moline, Ill., which was organized in 1914, has recently been incorporated with the following officers: President, A. E. Montgomery; vice-president and engineer, W. E. Howlett; secretary and treasurer, S. M. Howlett, and assistant secretary and treasurer, M. H. Rice.

The American Mason Safety Tread Company, 480 Lexington avenue, New York, on March 1 consolidated its general sales office for New England, New York State and New Jersey with the local New York City office, under the supervision of **J. W. Scott. L. H. Devoe** will continue to serve the trade in this territory as in the past, with headquarters at New York.

The Equitable Equipment Company, 411 Whitney Central building, New Orleans, La., has just completed its organization for the purpose of handling locomotives, cars, railroad equipment, rails and rail accessories, machinery of all kinds, contractors' equipment and second-hand machinery and equipment. This new company is taking over the equipment rail and machinery business of A. Marx & Sons, the Southern Scrap Material Company and the Ship Supply Company. The new firm will be under the direct management of **O. D. Cleveland,** who has been the manager of the New Orleans branch of the General Equipment Company.

The Arkansas Preservative Company has been organized by **E. B. Fulks,** president, and **John L. Pfeifler,** secretary, to make zinc chloride. The company has established offices in the Carlton building, St. Louis, and is now completing a plant to manufacture zinc chloride at Little Rock, Ark., which plant will be completed in about a month. Mr. Fulks was vice-president of the American Tar Products Company, Chicago, until last summer.

PERSONAL

Marcel Garsaud has been appointed New Orleans sales agent of the Whiting Corporation, Harvey, Ill., succeeding **J. S. Barelli.** Mr. Garsaud's office is in the Whitney Central Bank building, New Orleans, La.

Ralph T. Hatch, for the past 14 years with the National Malleable Castings Company, Cleveland, Ohio, has been appointed general manager of sales for the Reading Steel Company, a subsidiary of the American Chain Company, with headquarters at Reading, Pa.

Frank H. Freeman, assistant sales manager of the Anaconda Copper Mining Company, with headquarters at Chicago, has been appointed general sales manager of the Illinois Wire & Cable Company at Syracuse, Ill. Mr. Freeman will assume his new duties about April 1.

E. G. LeLaurin, southern representative of the Southern Supply & Hardware Company, with headquarters at St. Louis, Mo., has become associated with W. D. Jenkins, representative of railway equipment and supplies, with headquarters at Dallas, Tex. Mr. LeLaurin will have charge of the Dallas, Tex., Houston and New Orleans, La., territory.

Gunni Jeppesen, structural engineer of the Leonard Engineering Company, has joined the Chicago Bascule Bridge Company, Chicago, as associate engineer. Mr. Jeppesen, who is a graduate of the State Polytechnical Institute of Copenhagen, Denmark, was connected with the Strauss Bascule Bridge Company, Chicago, from its inception until 1917, serving in the capacity of chief engineer.

TRADE PUBLICATIONS

Uranium In Steel.—The history and function of Uranium in the making of Uranium steels, with analytical methods and test charts, is the subject matter of a 32-page booklet published by the Standard Alloys Company, Pittsburgh, Pa.

Lakewood Clam Shell Bucket.—The Lakewood Engineering Company, Cleveland, Ohio, has issued a 16-page bulletin illustrating and describing the application of the Lakewood clam shell bucket. Of particular interest is the use of the crane with a variety of hoisting equipment in the way of fixed cranes, locomotive cranes, etc., for use in a great many different types of operation. One page shows the bucket to a large scale with descriptive captions pointing out its important features.

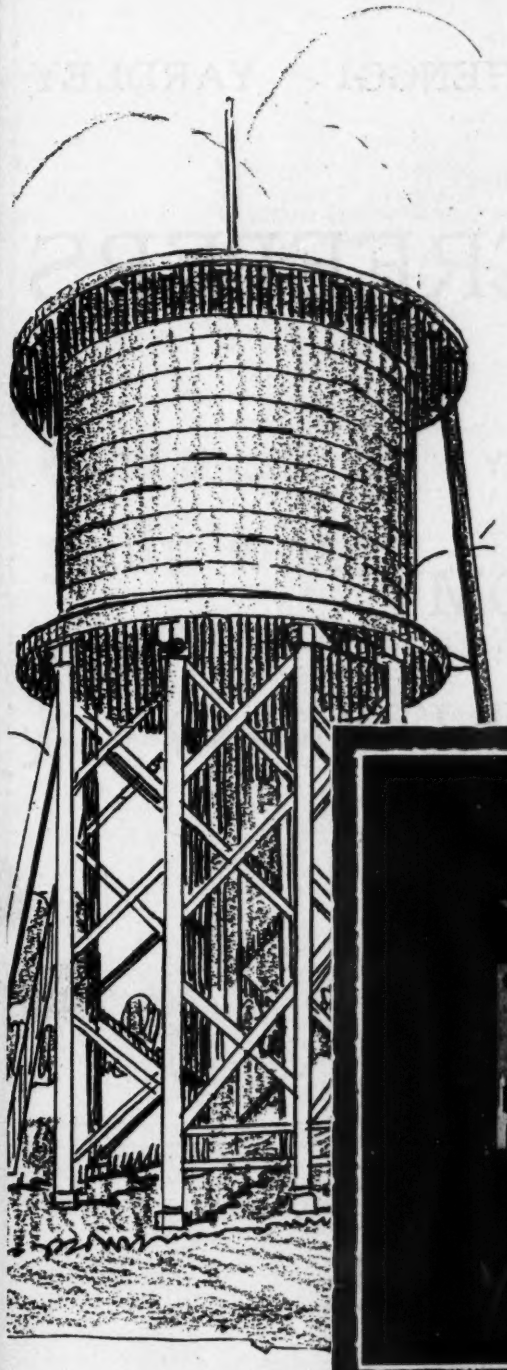
Rail Bonds.—Booklet No. 4 in the Airco Engineering Department's series of educational booklets is ready for distribution. This booklet entitled "Oxyacetylene Welding of Rail Bonds" has been written by A. S. Kinsey, Professor of Shop Practice, Stevens Institute of Technology and Advisory Service Engineer of the Air Reduction Sales Company. The book describes the application of signal bonds to rails by the oxyacetylene process. Data are given relative to the cost and efficiency of the oxyacetylene welded bond as compared with the channel-pin method of connection.

Oil Driven Air Compressors.—The oil engine driven air compressors manufactured by the Chicago Pneumatic Tool Company are described and illustrated in bulletin 607 recently issued. The booklet opens with a short general description of the machine and the type of fuel required and follows with a condensed, illustrated description of the important details of construction. One of the interesting features of the bulletin is a comparison of the cost of operating an oil engine compressor unit and the comparative cost of operating an equivalent sized steam driven compressor. The concluding pages are devoted to illustrations of the various types of machines with tables of sizes, weights, etc.

The report of the relief department of the Chicago, Burlington & Quincy shows that during 1920 the department paid $627,148 in sick and death benefits. Employees contributed $678,817. Income from investments was $20,625 and interest on cash advanced by the railroad was $7,013. There was an excess of $65,279 of receipts over disbursements.

The ticket scalping evil has been brought to the attention of the United States Treasury Department by the Railway Ticket Protective Bureau and internal revenue collectors have been notified to strictly impose the provisions of the Revenue Act of 1918 upon those engaged in the business. The department has directed all internal revenue collectors to secure the names and addresses of ticket scalpers and brokers from the bureau and to collect the regular 8 per cent tax on all amounts paid.

AMERICAN



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The American Centrifugal pumping installation pictured below is typical of the modern railway pumping installation.

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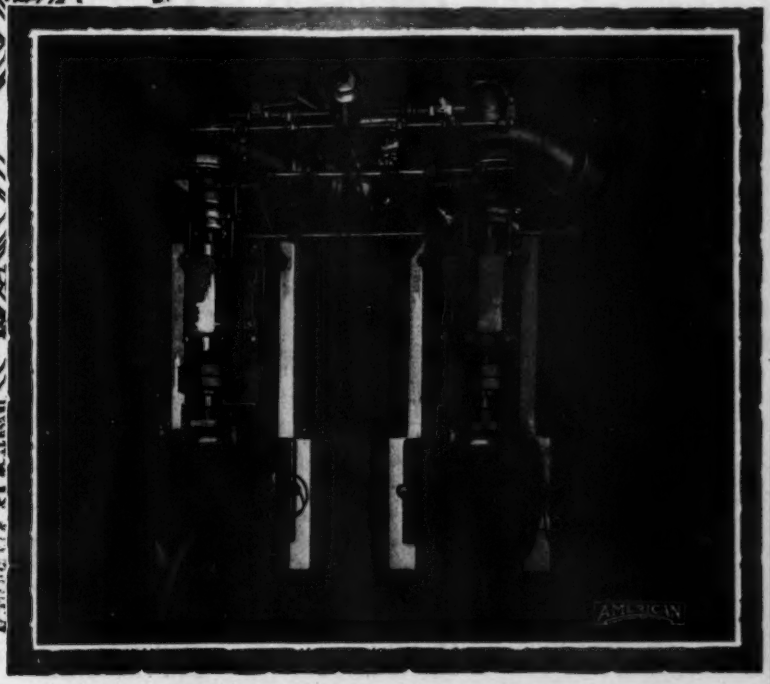

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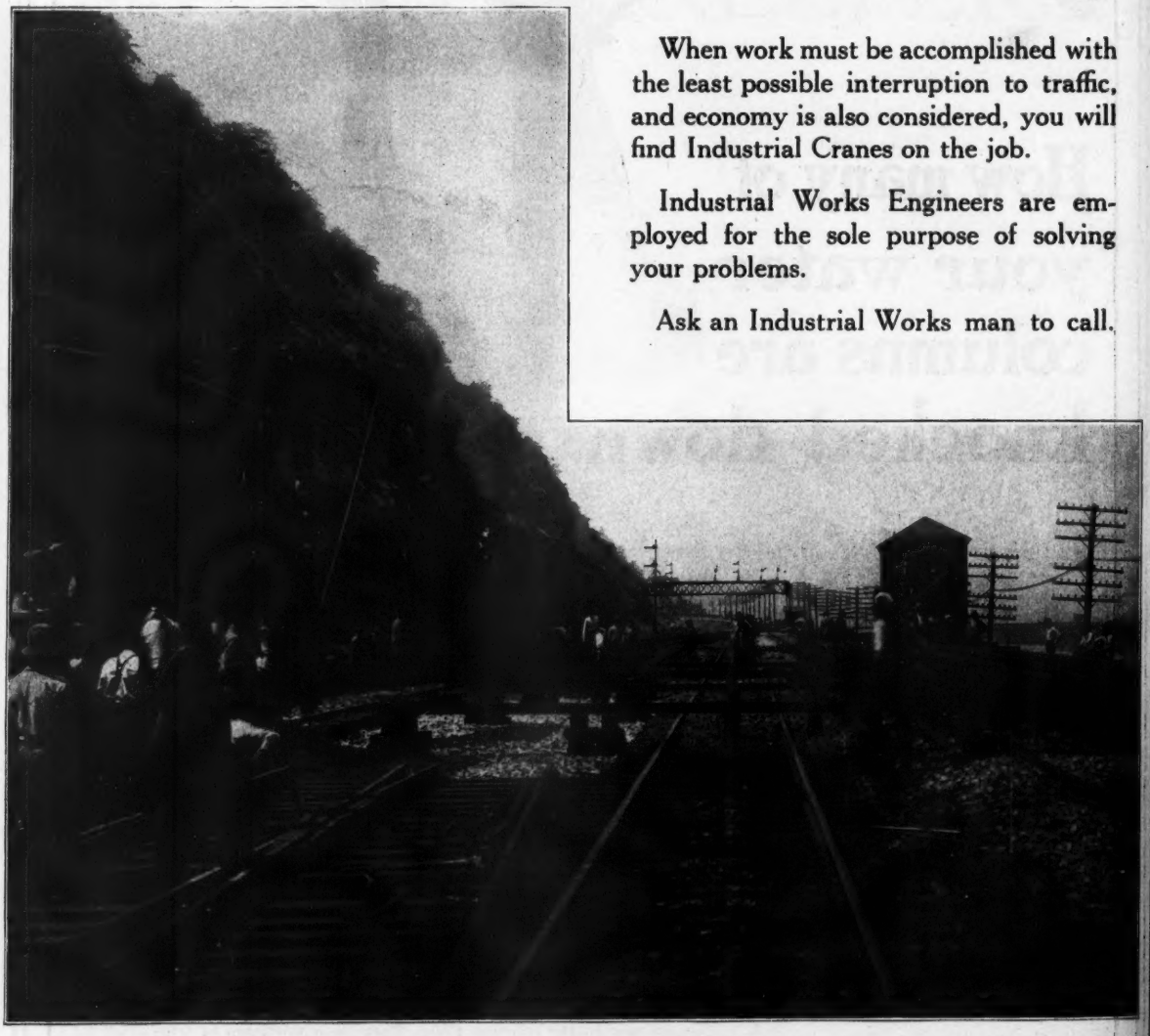

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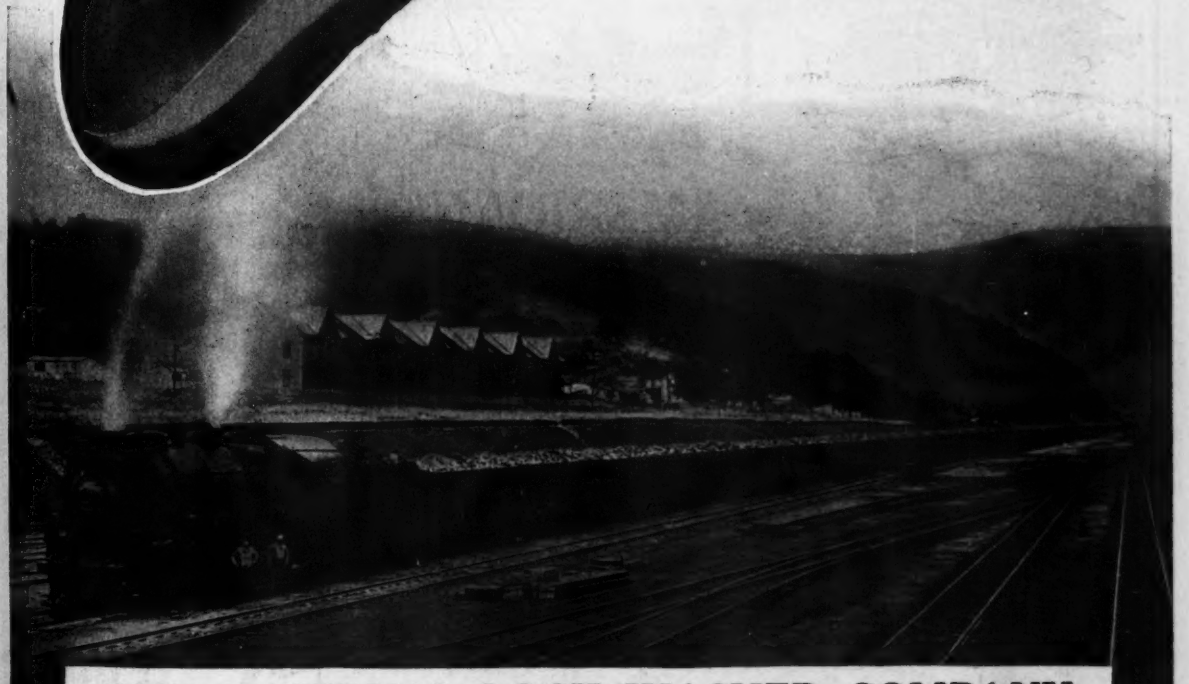

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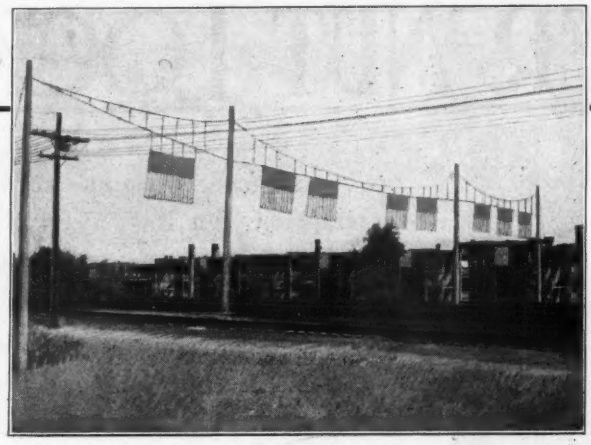

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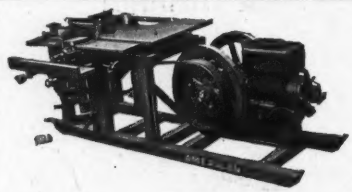
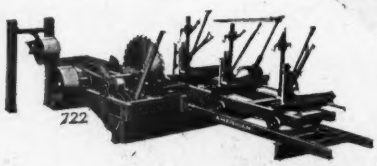
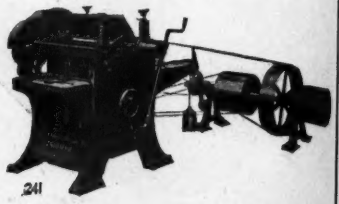
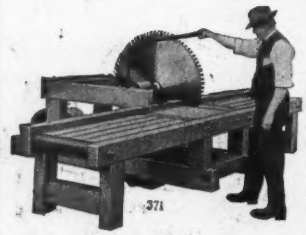

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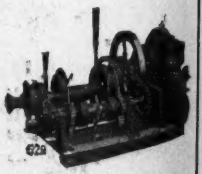

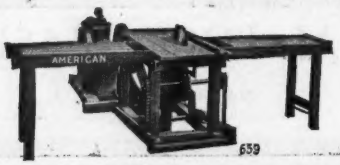

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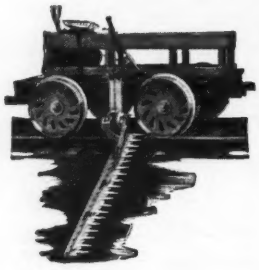

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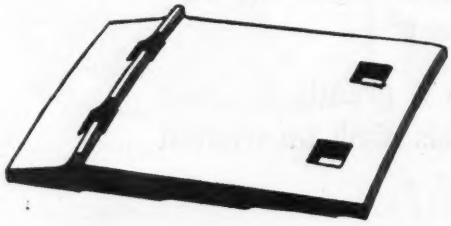

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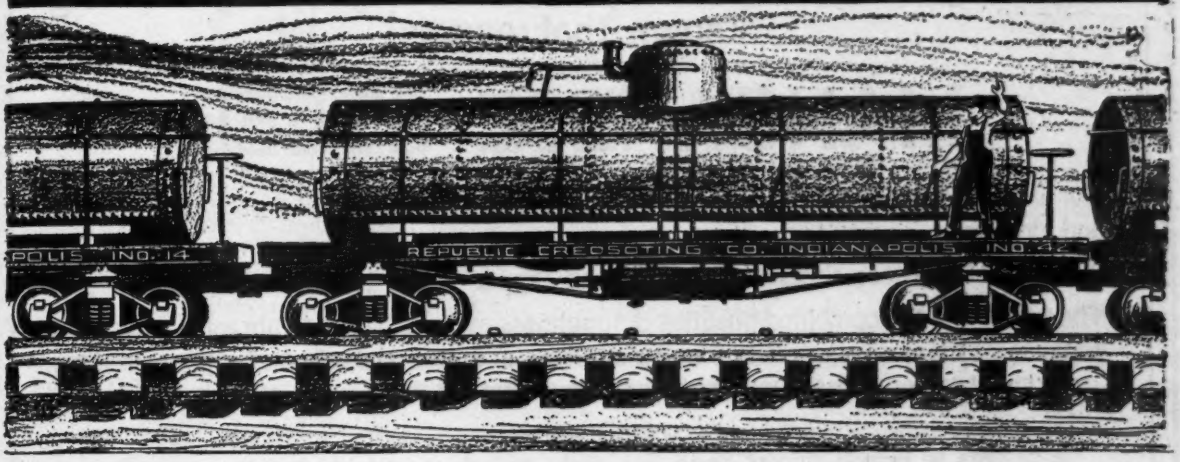

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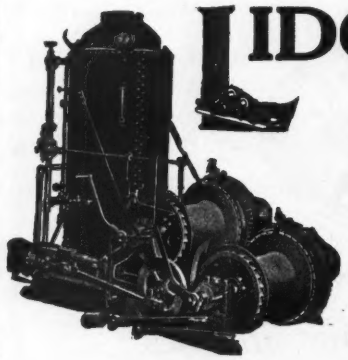

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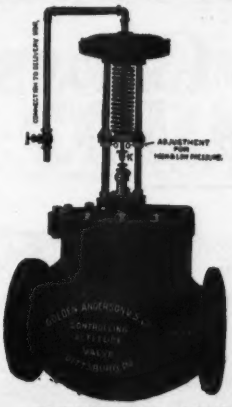

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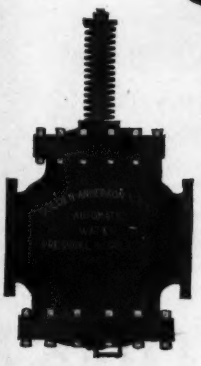

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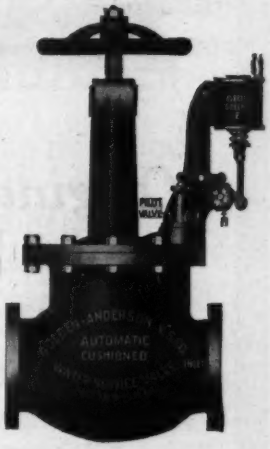

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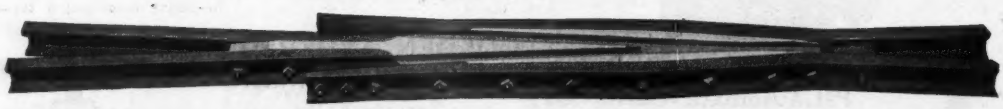

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Originators of the Use of Manganese Steel in Track Work

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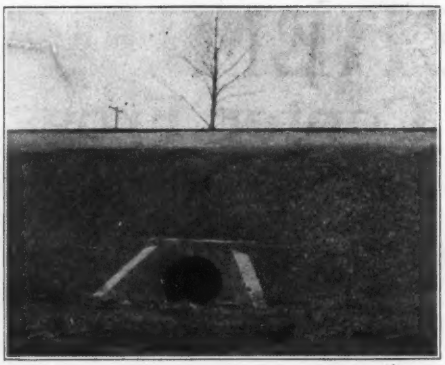

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comes to you in 3, 4 or 5 foot lengths. That's what makes it so easy to handle and install. No waste. No piles to drive. No fills to remove. No tunneling. Cast from pure remelted Alabama pig iron, which will not rust.

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5200 Pounds Up Grade

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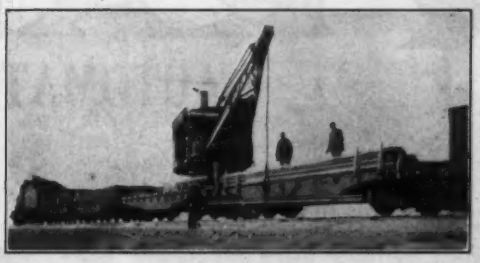

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Sent out to load rail along a busy stretch of the main line, one of the Northern Pacific Railway's "AMERICAN" Railroad Ditchers averaged 715 rails a day. Train service interrupted the work frequently, but the "AMERICAN" made the most of all "clear" time. Its best performance on this particular job was 85 rails loaded in 28 minutes.

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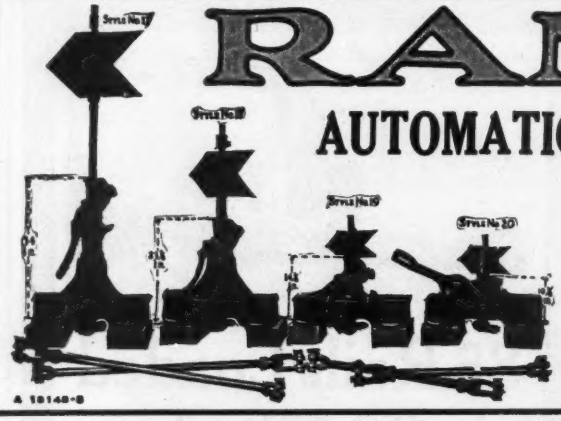

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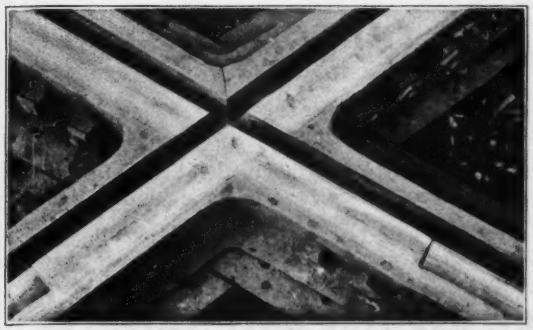
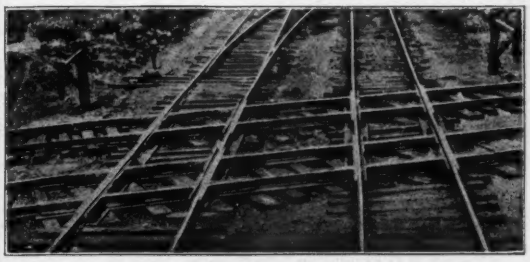


Four Heavy Duty Type Balkwill Articulated Cast Manganese Crossings, 67° 10', Installed by Nickel Plate R. R. over Chicago & Western Indiana R. R. at 94th Street (Stony Island), Chicago.



A corner in one of the Heavy Duty Type Crossings shown above. Manufactured by The Buda Company, Harvey, Ill., per Balkwill Drawing No. 11.

Over half a thousand ***Articulated Cast Manganese Crossings*** of various types have been sold to the following Railroads:

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Big Four R. R.
Butte, Anaconda & Pacific R. R.
Central California Traction R. R.
Chesapeake & Ohio R. R.
Chicago & Alton R. R. (Alton)
Chicago, Burlington & Quincy R. R. (Burlington)
Chicago & Eastern Illinois Ry.
Chicago, Rock Island & Pacific R. R. (Rock Island)
Chicago & Western Indiana R. R. (Chicago Belt)
Duluth, South Shore & Atlantic Ry.
Elgin, Joliet & Eastern R. R. (Chicago Outer Belt)
El Paso & Southern R. R.
Erie Railroad
Fresno Traction Company
Grand Trunk Railway
Gulf, Colorado & Santa Fe R. R.
Hocking Valley Railroad
Houston Belt & Terminal Company
Illinois Central Railroad
Louisville & Nashville R. R.
Minneapolis, St. Paul & Sault Ste. Marie (Soo Line)
Missouri Pacific Railroad
New York Central Lines
New York, Chicago & St. Louis R. R. (Nickel Plate)
New York, New Haven & Hartford R. R.
Northwestern Pacific R. R.
Pacific Electric Railway
Pennsylvania Lines
Peoria & Pekin Union
Pere Marquette Railroad
Portland & Southwestern R. R.
Richmond, Fredericksburg & Potomac R. R.
Seaboard Air Line Railroad
Southern Railway
Southern Pacific System
Stockton Electric R. R.
Toledo & Ohio Central R. R.
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The Balkwill Manganese Crossing Co.

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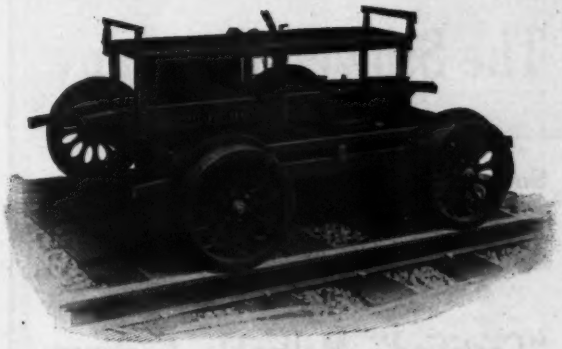

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Fairbanks-Morse

Sheffield

41

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The two cycle, horizontal engine runs on kerosene or gasoline. Air cooling does away with troublesome pump connections—no water to freeze in cold weather. Engine is mounted on sills separate from main frame—keeps strain off driving axle. Automatic primer makes starting easy—no cold weather trouble—no time wasted.

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Smooth surfaced, fine talc dusted finish. Special large-headed sherardized (zinc impregnated) nails and Ru-ber-ine Cement in each roll.

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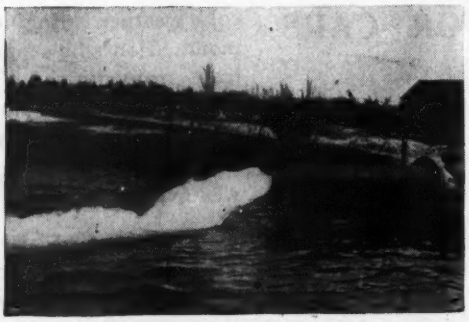

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is the ideal paint pigment for a protective covering for metal or wood surfaces.

It clings so tightly that there are no cracks or checks for moisture to enter.

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No wonder it is considered indispensable by all users of it.

Its wonderful records extend back over 50 years.

Its success has encouraged imitations. Be sure you get Dixon's Silica-Graphite Paint. It has no equal for durability and real economy, and no competitor. Write for Booklet No. 187B and long service records.

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ESTABLISHED 1827

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TRASCO "U" SPIKES

Simplest method of preventing Rail Creep at one-third the expense

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Aeron Painting System
Surpasses Brushing
Portable Painting Equipment

Every Painting Job

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The average speed of painting with the Aeron spray-painting system is four or five times that of the hand-brush method. This is not a one-day but an every-day average.

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The Aeron outfit is easy, convenient and clean to operate. This results in more satisfactory working conditions and in the work being kept up to highest standard.

Whether painting a bridge or a building, the savings and advantages are substantially the same.

We feel certain you will find complete operation and equipment facts INTERESTING—let us mail these to you.

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3682 Detroit Ave.

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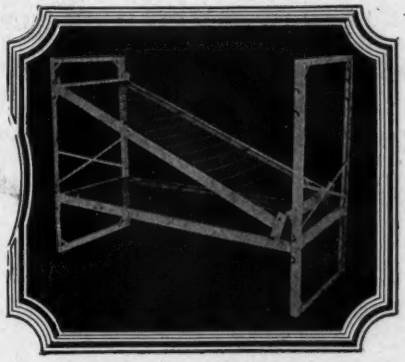

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The first cost of the new Romelink "99" is the last. Jarring ruined the old-style "boltless" bunk years ahead of time. That's where the new interlocking button system worked out in Romelink "99" all-metal bunk, means *years longer.*

Send for detailed information on this new Romelink product today.

Southern-Rome Company
Branch of Rome Metallic Bedstead Company
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Dependable Fibre for Railroad Work!

Made to excel—not merely to meet—specifications. Backed by a thorough knowledge of railroad conditions and requirements. Built upon formulas based upon prolonged use and severe tests.

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Dept. 12

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From Alaska to Australia and from Africa to the islands of the Pacific, they have been erected for every purpose. Wherever the American with his up-to-date methods goes, there Des Moines elevated steel tanks are to be found.

These reliable, long-lived structures have gained favor in many fields. They are installed for municipal and industrial water supply, for fire protection, and for railway locomotive water service.

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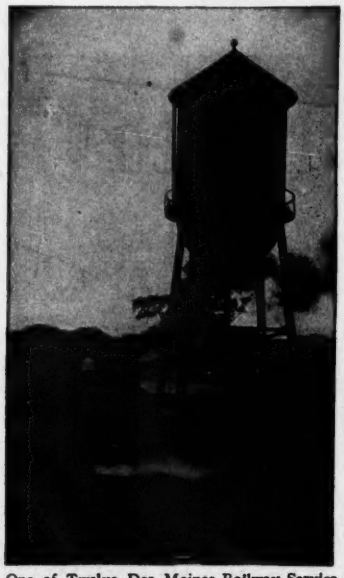
Canadian Des Moines Steel Co., Ltd., 242 Inshes Ave., Chatham, Ont.



One of Twelve Des Moines Railway Service Tanks on the Government R ilroad in the Philippine Islards.

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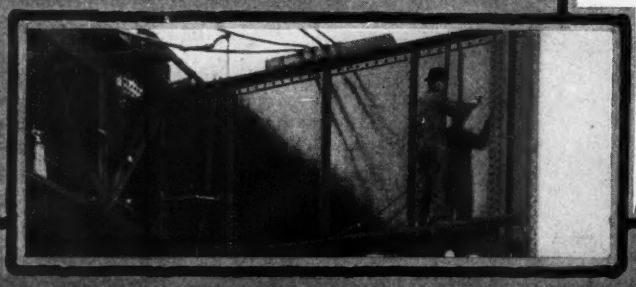

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Who ever heard of a man painting 8,000 sq. ft. of surface in one day?

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Guard Rail Clamps
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PROTECT the MEN who must work under Cars

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Besides you should not expect efficient work or careful inspection under such hazardous working conditions.

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Verona No. 1 Track Chisel, without re-grinding or redressing, after 5100 blows with a 12-lb. sledge.

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